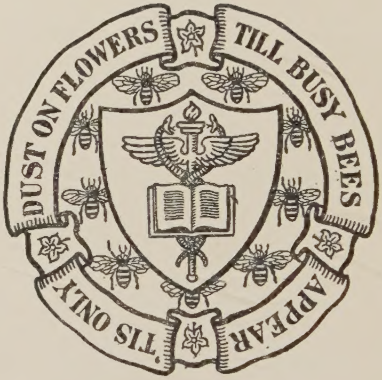
THE CRAFT OF ATHENIAN POTTERY

GISELA M. A. RICHTER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THE CRAFT OF ATHENIAN POTTERY

BY GISELA M. A. RICHTER

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THE CRAFT OF ATHENIAN POTTERY

AN INVESTIGATION OF THE TECHNIQUE OF BLACK-FIGURED AND RED-FIGURED ATHENIAN VASES

BY
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PREFACE

FOR our knowledge of the technique of Athenian vases we have various sources of information. There are a number of references to the craft in ancient literature; we have several actual representations of potters at work among extant vase paintings; and there is the important testimony of the vases themselves. The information gleaned from these three sources has been duly worked over by archaeologists, and the many accounts we have of the technique of Greek vases are all based more or less on this evidence. There is, however, another very important source of information ready to our hand which has not been fully utilized, namely, the study of the technical processes employed in the making of modern pottery. For, the nature and properties of clay being the same now that they were in Greek times, the manner of working it must have been essentially the same then as now. Many archaeologists have, of course, seen potters at work in different places, or perhaps consulted potters on specific points; but that is a different thing from getting a thorough knowledge of the craft oneself and learning once for all what is possible and what is not possible in clay-working.

The neglect of this highly valuable source of information has led to some surprising theories regarding the technique of Greek vases; and these theories have been repeated over and over again in our books on vases, for the simple reason that, not having any first-hand knowledge, we have copied these statements from one another. A modern potter reading these accounts finds them remarkable literature. The present writer, realizing her own ignorance on the many questions of clay-working, went to a modern pottery school. The result of this first-hand study was not only the acquisition of new knowledge, but a totally new insight into the whole subject. The present essay is an attempt to revise the current theories of the technique of Athenian pottery in the light of this practical experience.

Not only does such practical experience supply us with the knowledge essential for the consideration of technical problems, but it gives us a new appreciation of the beauty of Athenian vases. If we try to make such shapes ourselves we shall begin to observe many details which perhaps passed unnoticed before—the finely designed handles, the well-proportioned feet, the practical mouths; and the curves, the mouldings, and the subtle variations will become a constant delight to the eye. Moreover, we shall be impressed more than ever with the wonderful sense of proportion in Athenian vases. For the relation of the height to the width, the proportions of the neck, the body, the foot, and the handles to one another appear to be all nicely thought out. There is no hit-or-miss about it; the whole is an interrelated theme evidently planned carefully before making, either by the potter himself or by a professional designer.

In short, any one who has tried his hand in the production of Greek forms will understand very well that the makers of such vases were proud of their work and that the signature of a well-known potter was at least as valuable as that of a popular decorator.[1]

The pottery school to which I went was the New York State School of Ceramics at Alfred, New York. Throughout my work at the school and later in my investigation of Greek vases at the Metropolitan Museum, I had the great benefit of the advice of Professor Charles F. Binns, director of the school. In fact, any value which this paper may possess is largely due to this opportunity of appeal to someone who possesses the rare combination of expert knowledge in the field of practical pottery with a scholar's attitude toward the problems presented by the ancient ware. It is also a pleasure to acknowledge the many helpful suggestions made from time to time by Miss Maude Robinson, director of the pottery work at Greenwich House, New York, as well as by Miss Elsie Binns and Harold Nash, modern potters whom I have had the advantage of consulting on various questions. I am indebted to Miss Helen McClees for valuable assistance in the section dealing with the references to pottery craft in ancient literature. In my examination of Greek vases, which necessitated handling of the specimens, I was greatly helped by the courteous assistance of many museum directors.

---

[1] Reichhold's theory in his Skizzenbuch griechischer Meister (1919), p. 12, that the word ἐποίησεν (''made it'') in a signature refers to the draughtsman of the sketch for the decoration, while its executor signed ἔγραψεν (''painted it''), since the actual making of the vase ''required no artistic skill and could be left to every apprentice,'' only shows his exclusive preoccupation with the drawings on the vases, in the copying of which he so much excelled.

The plan of this book is as follows: The first chapter gives a concise account of the processes in use in the making of vases at modern pottery schools[1] and their application to the technique of ancient vases. The second chapter contains a description of the various representations we have of ancient potters at work. In the third chapter are collected the chief Greek and Latin texts referring to the ancient pottery craft. After this presentation of all the evidence on the technique of Athenian vases comes a short summary of the new conclusions arrived at, and a selected bibliography.

The illustrations of modern pottery scenes were taken under the direction of Charles F. Binns at the New York State School of Ceramics, Alfred,[2] and of Maude Robinson at pottery studios in New York City.[3]

---

[1] For any one who wishes to study this subject at greater length, Charles F. Binns's work on the Potter's Craft is strongly recommended (second edition, 1922).

[2] Figs. 1, 2, 6-13, 14, 21-23, 27, 39, 41.

[3] Figs. 3, 4, 35, 36, 40, 42, 50, 51, 52.

I. TECHNICAL PROCESSES

IN THE MAKING OF MODERN POTTERY AND THEIR APPLICATION TO THE TECHNIQUE OF ANCIENT VASES

PREPARATION OF THE CLAY

Ingredients and properties.

THE making of a pot begins in the clay bed. The clay has to be found, it has to be transported, and above all it has to be tested to see whether it is adapted to the potter's needs. For there are many different kinds of clay and they are as individual as human beings; so that a thorough understanding of them is essential to the successful potter.

The chief ingredients of clay are silica, alumina, and water. Other possible ingredients are iron oxide, lime (calcium oxide), magnesia, and potash. To the iron compounds are due the different colors of the clay. When potters speak of the color of a clay—red, yellow, white—they refer to the color after burning, not in the raw state. The tones of the color are controlled by heat; for instance, a red clay becomes first pink, then in a higher fire a deeper red, and in a still higher fire a brownish red.

The potter demands three properties of his clay: (1) plasticity, the property which enables the clay to acquire form; (2) porosity, the property which enables the water to escape; and (3) vitrification, the property which enables the clay to be fired. These three properties are due to the three chief component parts of the clay; namely, clay base, quartz, and feldspar. It will be found that some clays are not plastic enough, others not sufficiently porous, and others again not properly vitrifiable; in such cases the addition of certain substances is necessary to make the clay usable.

The actual composition of the clay, therefore, is of great importance, as no amount of skilful labor will avail if the clay itself has not the right consistency.

Washing.

When the right composition of the clay has been assured, the next step is to wash it and separate it from the many natural impurities, such as stones, sticks, etc., with which it is mixed. A clay not properly washed is a source of great vexation in the later stages of pottery making. The best method is that of "blunging," that is, the dry clay is put into water and stirred constantly until it reaches the consistency of cream, technically called "slip," whereupon it is poured through sieves, coarse or fine according to the desired consistency. The liquid clay or slip must then be dried sufficiently to become plastic and workable. This can be done either in filter presses in which the water is squeezed out in a comparatively short time, or in shallow receptacles in the open air where the water is allowed slowly to evaporate.

Wedging.

But even at this stage the clay is not yet ready for use; it has first to go through the important process of kneading or "wedging." This consists of cutting a ball of clay in two against a wire (fig. 1), slapping the two parts on a plaster or wooden board, one on top of the other (fig. 2), then lifting up the whole lump, cutting it in two again, and slapping it down as before. The purpose is to remove all air bubbles and to correct irregularities in hardness. The operation has sometimes to be repeated fifteen or twenty times before a good texture is secured.[1]

---

[1] In commercial potteries where a larger output and coarser wares are produced wedging *en gros* becomes necessary. In modern Greece it is done by treading the clay with bare feet.

We learn from the above survey that the fine consistency of the clay in Athenian and in some other Greek wares is not necessarily due to its natural state, but to the careful washing and kneading undergone in its preparation for use. When different particles are found in the fired clay they are due to indifferent washing. And the varying shades of pink and red of Greek vases likewise do not presuppose different kinds of clay, but are due largely to the various temperatures to which the vases were fired. We have too often made our analyses of clays of Greek vases without due cognizance of these facts.

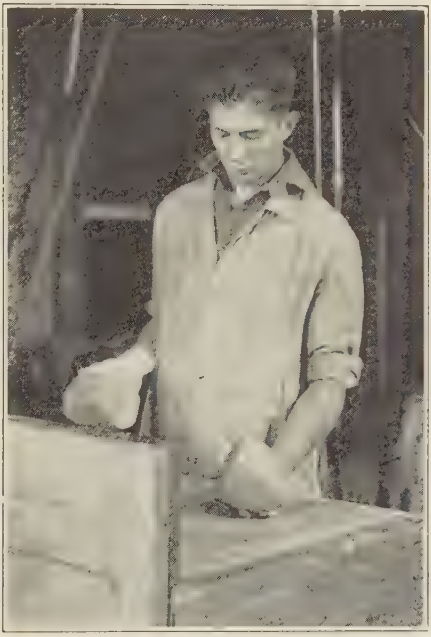

Fig. 1. Wedging (a)

FASHIONING THE VASES

(1) WHEELWORK

There are three principal ways of making vases—fashioning them on the wheel, building them, and making them from moulds. Let us examine first the work on the wheel, the potter's tool par excellence.

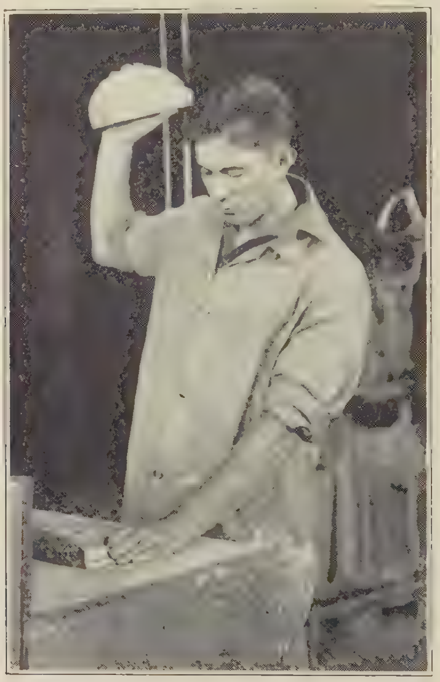

Fig. 2. Wedging (b)

Types of wheel.

There are various types of wheel in general use today. The wheel run by electric power does not concern us here since it cannot have been used by the Greeks. In studio potteries, a kick-wheel is often used. In this the operator stands and kicks with his left foot against a treadle, the weight of his body being supported by the right (fig. 3). Another fairly popular type has a large, heavy disk at the bottom revolving in a horizontal plane, and kept in motion by one foot of the operator (fig. 4). A very simple type of wheel in use some time ago is illustrated in fig. 5. Here the motion is imparted by an assistant turning the handle.

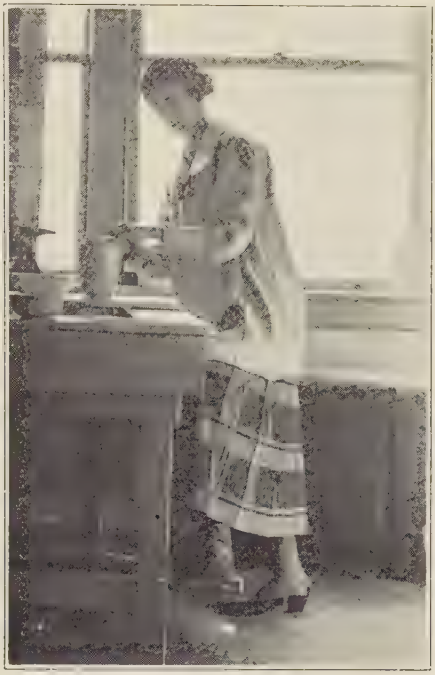

Fig. 3. Kick-wheel with treadle

Any one of these three types may have been used by the Greeks. In the representations of ancient potters at work (cf. pp. 64 ff.) the wheel appears to have been propelled either with the foot or by an assistant.

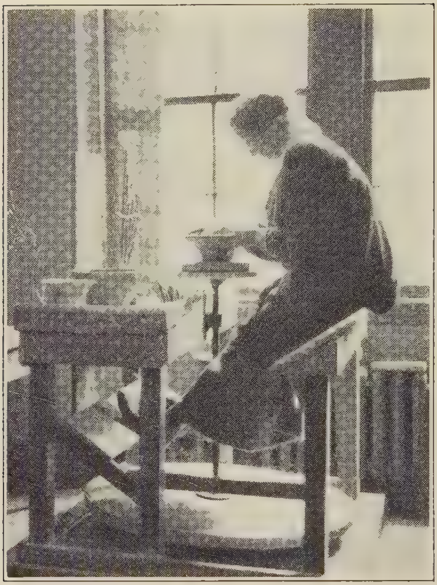

Fig. 4. Kick-wheel with disk

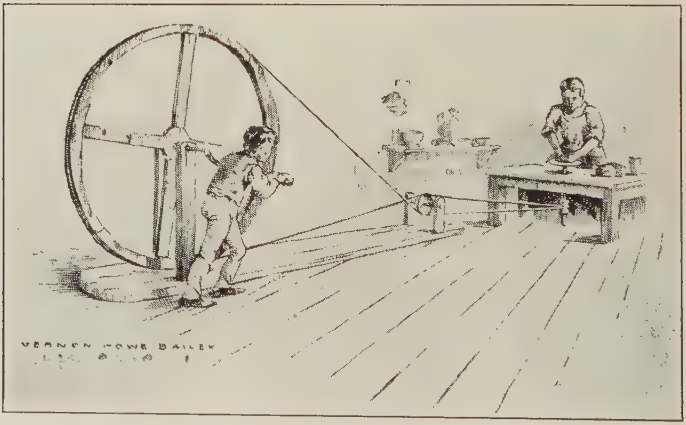

Fig. 5. Wheel put in motion by assistant turning handle
Barber, *The Pottery and Porcelain of the United States*, p. 4, fig. 2

Throwing.

The first task in fashioning a vase on the wheel—or "throwing" it, as it is technically called—is to center the ball of clay on the wheel-head. It is accomplished by pressing the left hand against the ball of clay as it revolves rapidly, care being taken to keep the left forearm abso-

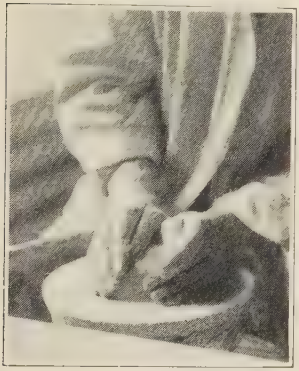

Fig. 6. Centering ball

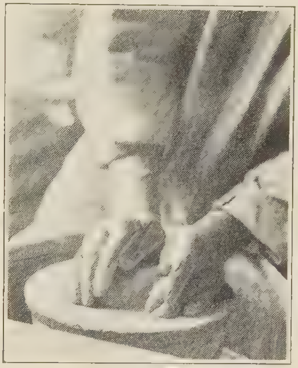

Fig. 7. Pressing clay down

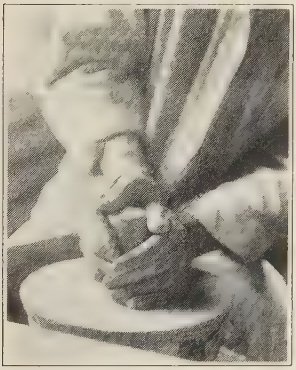

Fig. 8. Squeezing clay into cone

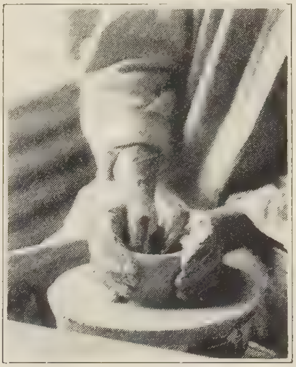

Fig. 9. Inserting thumb

FIGS. 6-9. Processes of throwing

lutely rigid (fig. 6). The right hand is used for keeping the clay wet by sprinkling it with water, and for pulling the clay inward, thus squeezing it up to a cone. The cone is pressed up and down in this manner several times (figs. 7 and 8). When the ball runs perfectly true, it is time to open it by inserting the thumb in the center (fig. 9); then

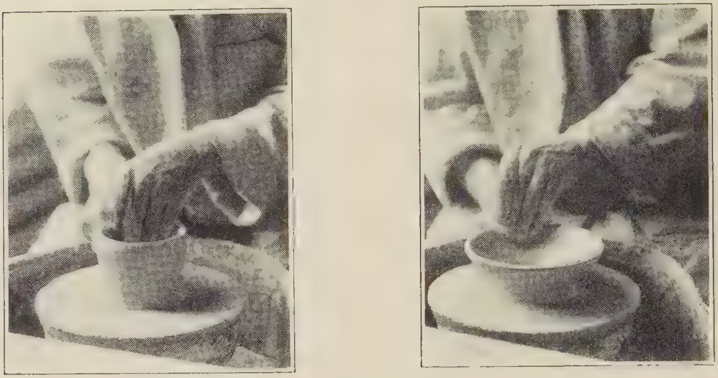

Fig. 10. Making cylinder

Fig. 11. Making bowl

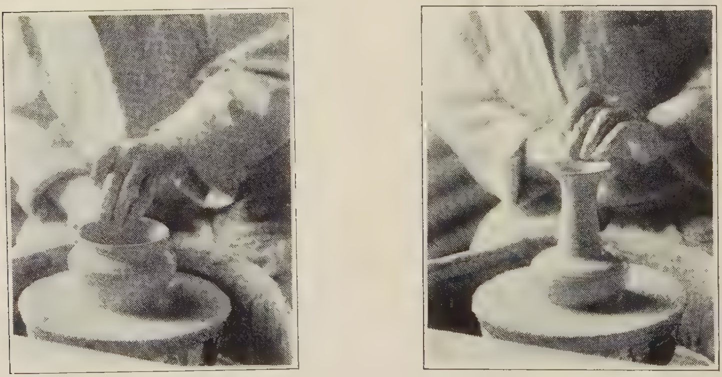

Fig. 12. Making jar

Fig. 13. Making bottle

Figs. 10-13. Processes of throwing

by placing the fingers of one hand inside the hollow, and the fingers of the other on the outside,[1] and by raising both hands gradually several times and squeezing the clay lightly while so doing, a cylinder is formed (fig. 10). The cylinder is the foundation of all other shapes. For to produce a bowl, one need only pull out the cylinder a little at the top (fig. 11); to make a globular jar, pull it out at the bottom and in at the top (fig. 12); to fashion a long-necked vase, pull it out at the bottom and in at the top, leaving enough clay to spin the top into a tall, narrow cylinder which will serve as a neck (fig. 13); and by various other manipulations one can produce almost every variety of shape. To throw a vase to specific measurements, a careful drawing of the shape should first be made and calipers and measuring sticks kept close at hand for checking the work as it proceeds.

The earliest Greek vases are made by hand; but from the Early Minoan III and Middle Helladic I periods (i. e., about 2200 B.C.) in certain places at least, vases were regularly thrown on the wheel. They could not have the regular and symmetrical outlines they have if they were built by hand, and many would show traces of vertical joints if they were made in moulds.

That the processes of throwing were identical with those described as in use today, there is of course no means of determining; but they certainly must have been similar, as clay has not changed its nature from Greek times to ours. The evidence which we glean from representations on Greek vases of potters at work, scanty though it is, bears out this self-evident fact. From the above description it will be noted that in this work of throwing the simultaneous use of both hands is necessary—an important fact to remember when interpreting scenes to be related to the fashioning of vases.

---

[1] Sometimes a wooden scraper is held on the outside to obtain a smoother surface; especially in cases when the later process of turning is dispensed with.

Turning.

After a piece has been thrown on the wheel, it has assumed its general shape, but that is all. The thinning of the walls, the refinements of foot and lip, all such finishing touches must be reserved for the next process. This is known among modern potters as "turning." In this the clay is no longer in a wet state, but in a "leather-hard" condition, and it is not worked with the hands but with steel cutting tools. A newly shaped vase becomes leather hard after it has been kept in the air and the water allowed to evaporate for about twenty-four hours. Pieces in this state are hard enough to be handled with care and to be cut easily with a knife. They are not so fragile as either in the

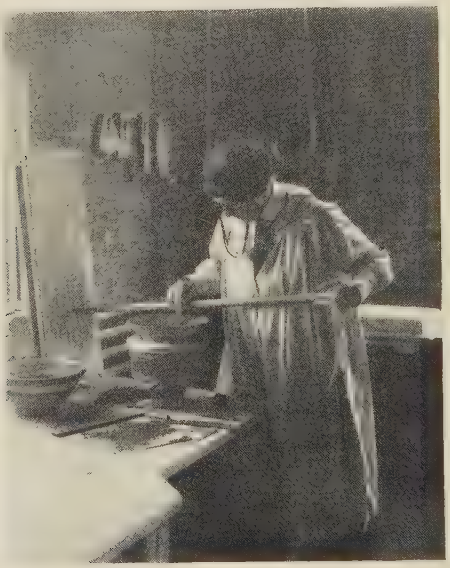

Fig. 14. Turning a vase

wet or in the "bone-dry" state, but they are still delicate and exposed to many dangers. Not until a vase has been fired is it safe to handle it freely. The cutting with the steel tools is done on the wheel (or "jigger"[1]), the right hand which grasps the tool being kept steady by letting it rest on a stick held in the left hand; the stick should have a sharpened nail on one end, the point of which is pressed into a wooden board at the height required (fig. 14). By continued cutting off of thin shavings of clay and by adding more clay in slip form when more is needed, the final outline of the shape and the various grooves and mouldings for lip and foot can be obtained. But it is a slow process, requiring time, care, and great patience. For the smoothing of the surface, scrapers, sandpaper, and sponge are useful.

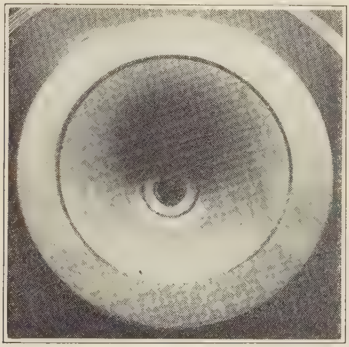

Fig. 15. Turned foot

Met. Mus. Acc. No. 12.234.2

This turning or refining of the shape after throwing, was, as we might expect, not in universal use in ancient times. Prior to the sixth century B.C. it was used occasionally here and there, and often only to a limited extent. But there cannot be the slightest doubt that in the Athenian black-figured and red-figured vases extensive use was made of the turning tools. The grooves and mouldings for lip and foot were produced by this turning process, not, as modern archaeologists tell us, by the use of moulds.[1] For this there is abundant proof. The feet of Athenian vases are almost all turned at the bottom, some with remarkable care and finish (fig. 15), not left flat, as they would be after throwing (fig. 16). The lids of pyxides and similar vases could not have been made to fit so neatly on their ledges without the use of turning. Above all, the wonderful finish and precision of Athenian vases could never have been attained by mere throwing. But there is even more convincing proof. Unless the marks of the turning tools are very carefully obliterated (with scrapers, sandpaper, and sponge), traces

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[1] The jigger is the technical word for the wheel on which shapes are moulded with the aid of a jolly or profile; but it can be used for other purposes. The difference between an ordinary wheel and a jigger is that in the former the speed is changeable, in the latter fixed.

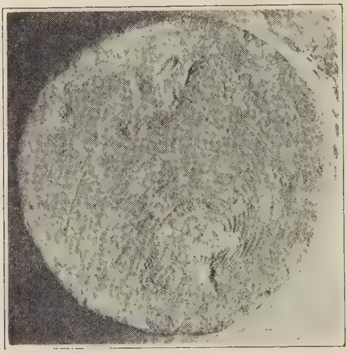

Fig. 16. Foot left as thrown
Met. Mus. Acc. No. 07.232.30

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[1] Cf. e.g. Walters, Ancient Pottery, vol. I, p. 208; Herford, Greek Vase Painting, p. 9; etc., etc.

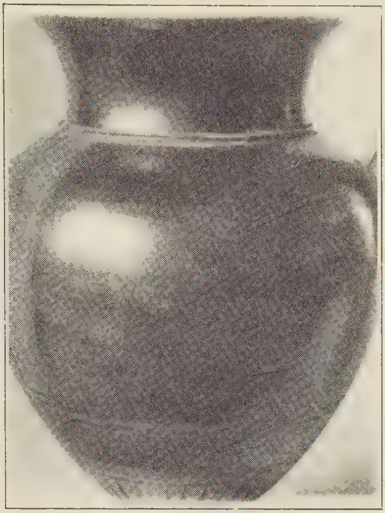

Fig. 17. Turning marks on outside of vase
Met. Mus. Acc. No. 06.1021.64

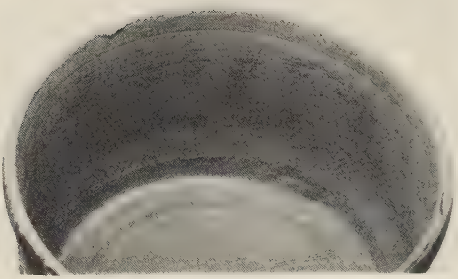

Fig. 18. Turning marks on inside of vase
Met. Mus. Acc. No. G.R.1228

of them are always visible. And this is the case also in Athenian vases. The outside surfaces are generally carefully smoothed, but even there the ridges formed by the tools are often discernible (fig. 17); and on the inside of the necks or feet or lids such ridges and concentric or spiral scratches are quite frequent (fig. 18). They are very different, however, from the finishing marks left in handwork (fig. 19). To appreciate the fine, smooth surface which work with the turning tools produces, we need only examine the insides of most Athenian amphorai and hydriai; for these, being more or less concealed, are generally left as thrown, often showing the spiral ridges which rapidly revolving clay will cause (fig. 20). They thus form a striking contrast to the finely smoothed outside surfaces.

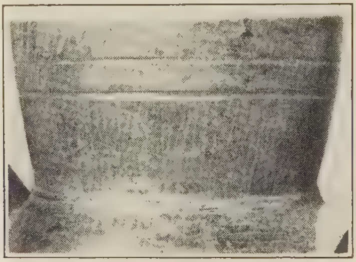

Fig. 19. Finishing marks left in handwork

Met. Mus. Acc. No. G.R.834

The fact that the Athenian potter made use of the turning process shows incidentally that he was able to make his vases to very exact measurements. This is important in connection with Jay Hambidge's theory that Athenian pottery was carefully designed on certain geometrical principles;[1] for if the Athenian potter had confined himself merely to throwing on the wheel that would not have been possible. It is during the second process of turning that an expert potter can effect many changes in width and height or in details, and thus make his product correspond exactly with his carefully planned design. Modern potters of standing work in the same way today. They first make a drawing of a vase, full size or to scale, and then proceed to follow this drawing in every detail, using rules and calipers for their guidance. Of course it needs a great deal of skill and patience to be able to work so exactly; but Greek potters, we can be quite sure, had a good supply of both of these qualities.

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[1] Cf. Jay Hambidge, Dynamic Symmetry, the Greek Vase, and L. D. Caskey, Geometry of Greek Vases.

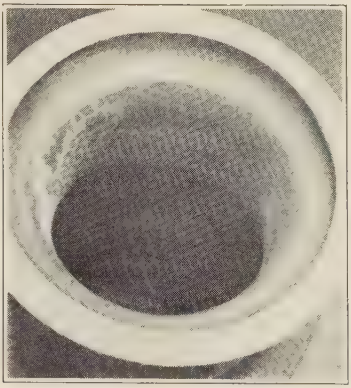

Fig. 20. Unturned inside of amphora

Met. Mus. Acc. No. G.R.545

Work in sections.

So far we have spoken only of comparatively small vases, which can be thrown all in one piece. Larger vases are best thrown in sections. To throw large jars in one piece requires great physical strength, and it is very difficult to finish such jars properly on the inside and to prevent them from being unduly heavy. The section work is by no means easy. At first a drawing of the vase has to be made, either full size or to scale, and the heights of the different parts marked off. While throwing the respective pieces use must be made of measuring sticks and calipers, to obtain the right heights and diameters. The measurements should be those of the soft clay, which will of course be slightly larger than those of the final shape. About one-eighth is the average allowance for the shrinkage of the clay in drying and firing. This shrinkage will naturally be proportional; so that the relation of every part to the whole will be the same in the fired vase as in the thrown product. The joining is obtained by applying a thick slip of the same clay as was used for the vase, to act as a binder. When all the sections are in place the outside of the vase can be "turned." If this and the foregoing processes are done skilfully the final joints will hardly be visible, even before the glaze is applied. Figs. 21, 22, 23 show the three chief stages in the making of a vase in sections.

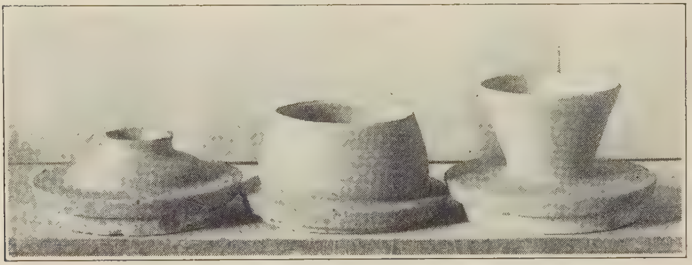

Fig. 21. Vase thrown in sections

To obtain good results in this work it is important that it should not be hurried. It is best, for instance, before joining the sections, to let them stand on top of one another for a day or longer, in order that they may mature together. To retain the pieces during this time in leather-hard condition, they must be kept in a "wet cellar," that is, in a moist place where the water in the clay will not evaporate (fig. 24). With this simple precaution pieces can be kept leather hard practically indefinitely.

Section work was used by the Greeks, as it is now. There would, in fact, be nothing gained in throwing the very large vases, such as some of the kraters and amphorai, all in one piece; and though the joints are, as a rule, skilfully concealed, they are plainly visible on certain examples, especially on the inside. Where possible the joints seem to have been made at the natural angles or "articulations" of the vase (that is, at the neck, the foot, etc.); and further to simplify the work, a thin ridge of clay was often added to conceal the joint.[1]

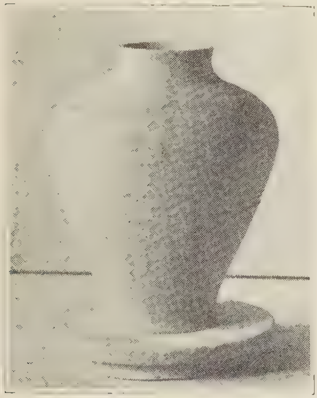

Fig. 22. Sections in place

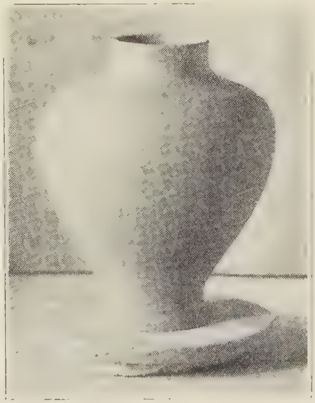

Fig. 23. Vase after turning

One of the most difficult things to throw successfully is a flat, wide bowl on a foot; and the larger the diameter of the bowl the more difficult the task, since the overhanging rim almost always sags at the critical moment. The fifth-century kylix has therefore always been rightly admired as one of the greatest feats of the Athenian potter. How did he prevent the bowl from sagging? Did he throw it upside down and hollow it out later with the turning tools? Or did he make the base very thick and then "turn" it down to fit on a slender foot? Both methods would be clumsy, as they would entail lengthy turning work. Or was the Athenian potter so skilful that he somehow prevented the clay from sagging? Not at all. He simply threw his kylix in two sections; the foot with a bowl about half the required diameter in one piece (or possibly two, with the foot separate), and the remaining part of the bowl as a separate section. The joints where the two parts of the bowl were united are

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[1] Cf. e.g. in the Metropolitan Museum Nos. 08.258.21 and 12.236, where the joint is visible underneath the clay ridge.

Fig. 24. Wet cellar

clearly visible on many kylikes on the outside (fig. 25)[1]; the inside of the kylix, being the most conspicuous part, is always so carefully turned that no joining can be detected.

Polishing.

To impart a polish, the blade of a knife is applied to the surface while the vase is revolving; for an inward curve a curved tool must be used. The operation is simple and can be accomplished in a few minutes. It is not often employed, however, by the modern potter, whose object is to keep the pores of his vase open for the better adhesion of the glaze with which he intends to cover the surface of his pot.

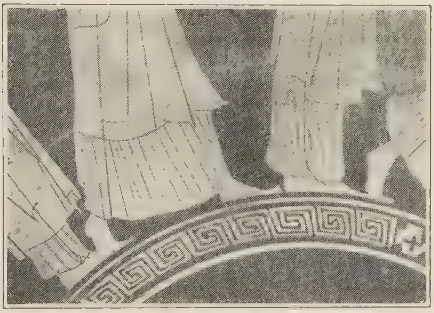

Fig. 25. Detail of kylix showing joint
Met. Mus. Acc. No. 06.1021.167

The Athenian potter, on the other hand, put great stress on giving the surface of his vase a fine polish; probably using the simple method described above. The difference between a polished and an unpolished surface is clearly seen on some vases on which the potter has omitted to repolish the parts round the handles where the slip used for the attachment had spilled over (fig. 26).

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[1] Cf. also especially Metropolitan Museum Nos. G. R. 534, 09.221.47, 09.221.48, 06.1021.168, G. R. 581, 18.145.28, etc.

Attachment of handles.

The final process in the fashioning of a vase is the attachment of the handles. These can be made either in moulds or by hand. Any one who thinks that the making of handles is a simple or quick process will soon be undeceived. Whether working in plaster, as one would if the handle is made in a mould, or in clay, if it is made by hand, the potter must bestow infinite care on the work, as both clay and plaster are very liable to break; and working on so small a thing as a handle is extremely fussy. The writer personally found nothing so difficult in her whole pottery training as the making of handles. The best method of procedure in handwork is first to shape the handle roughly

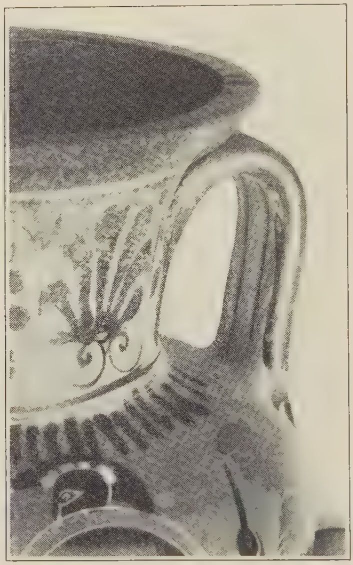

Fig. 26. Detail of amphora showing difference between polished and unpolished surfaces

Met. Mus. Acc. No. G.R.530

while the clay is soft and plastic, then wait until it becomes leather hard, and finally refine it to the desired form and finish with modeling tools. In moulded work, the handle has to be cut out in plaster and then used for making the mould. When the handles are finally made, they are joined to the vase by means of slip, in the same way that the sections were (fig. 27). As the handle is pressed into position the superfluous slip will of course spill over the edge, and this has to be carefully removed and the surface smoothed before the vase can be pronounced finished. The vase is then put in the drying room so that all the water in the clay may evaporate. Only when it is perfectly dry can it be fired in the kiln: otherwise it is liable to crack.

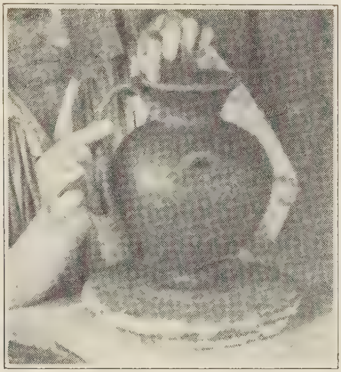

Fig. 27. Attachment of handles

The handles of Athenian vases show perhaps better than anything else the great skill and sense of beauty of the Athenian potter; and they will repay detailed study (cf. figs. 28-33). They are never, as so often on modern vases, detached pieces stuck on the vase as a kind of afterthought. Rather, they seem to grow out of the vase like branches from a tree, which gives them a wonderful, living quality.

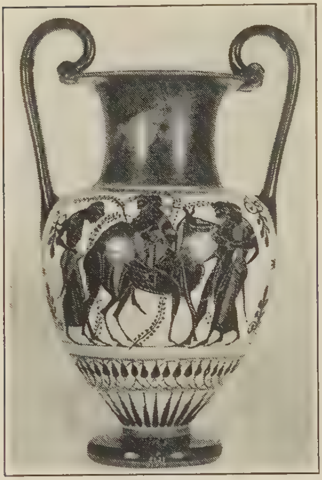

Fig. 28. Amphora in the Boston Museum
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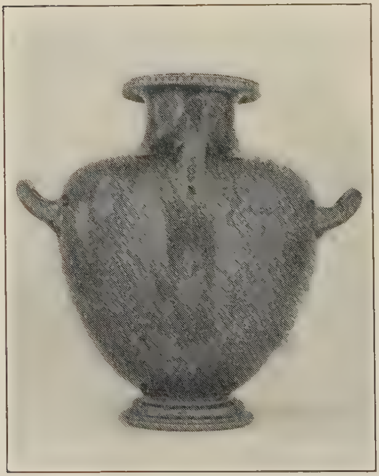

Fig. 29. Hydria in the Metropolitan Museum
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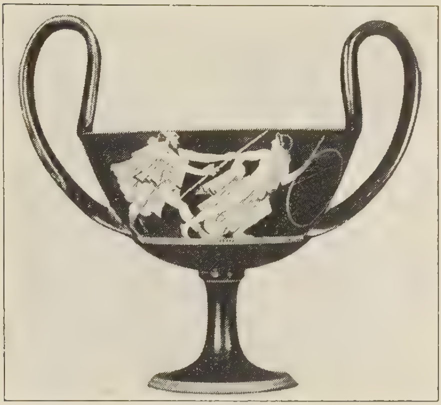

Fig. 30. Kantharos in the Boston Museum

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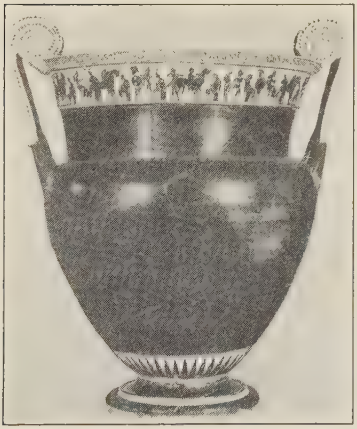

Fig. 31. Volute krater in the Boston Museum

Acc. No. 90.153

Moreover, the place where they were attached, the size, and the curve have been carefully considered both from a practical and from an aesthetic point of view.

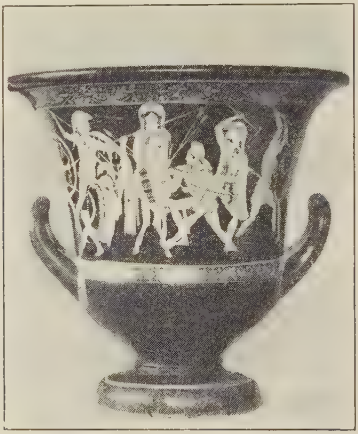

Fig. 32. Bell krater in the Metropolitan Museum
Acc. No. 07.286.86

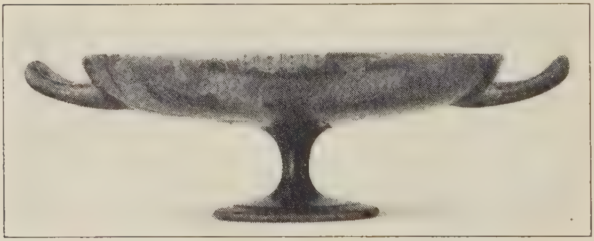

Fig. 33. Kylix in the Metropolitan Museum
Acc. No. G.R.1047

Athenian handles are made by hand, not in moulds. Practically every pair of handles shows perceptible variations such as are unavoidable in handwork and distinguish it from the mechanical products of moulding. The handles were attached to the vase in leather-hard condition, and often the pressure entailed thereby resulted in a slight bulge on the inner side. This is particularly noticeable on kylikes where the walls of the pot were especially thin.

It may be noted that the handles of Athenian vases are not finished off neatly in parts where they were not seen.

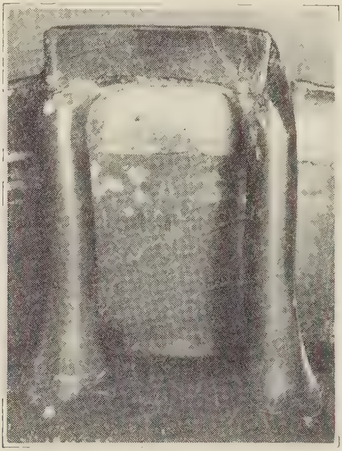

Fig. 34. Detail of krater showing under part of handle left rough
Met. Mus. Acc. No. 07.286.73

For instance, the under parts of handles on column kraters are generally left quite rough (fig. 34). This fact, together with that already observed, that the insides of amphorai and hydriai are usually unturned, shows that the Greeks, at least, had no such theories as those often held today that a work should be finished perfectly all over, even in places not ordinarily seen, and were quite willing to save trouble when possible. Many potters today bestow as much care on the inside of a narrow flask as on that of an open bowl. It is characteristic of the sense of proportion of the Greeks that their potters took infinite trouble with what was important

—the shapes, the proportions, the decoration—but that they did not spend time and labor where it profited nobody.

(2) BUILDING

Compared to the wheelwork the building appears simple at first, but experience will soon show that it too needs considerable practice. Though the actual process has not the glamor and thrill associated with wheelwork, there is a certain quality in a built vase which gives it a value of its own. Building is generally done nowadays by means of coils of clay (fig. 35), which must be a little thicker than the walls of the vase are to be and should be as uniform as possible. To make the foot of the vase, the end of one of these coils is laid in the center of a plaster bat and the rest coiled round in spiral line. To hide the joints the surface is rubbed over with the fingers on both sides. In making the walls of the vase a coil is used for each round and the superfluous clay pinched off, every new coil being begun at a new point. The whole surface, inside and outside, is

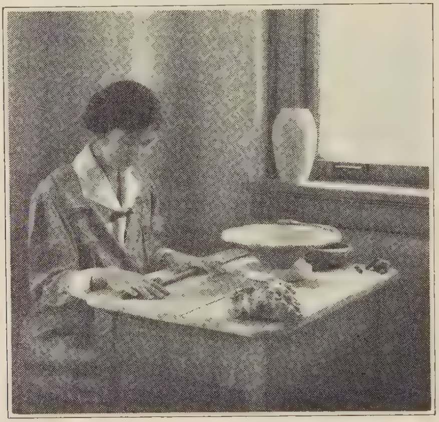

Fig. 35. Making coils

again smoothed by rubbing with the fingers, using very little water in the process. Only about three coils should be worked in at a time and then left to harden before new coils are added. In building up a certain shape it is best to use a templet of cardboard or plaster, to be sure that the profile of the vase is followed out correctly. To give the required finish at the end, modeling tools as well as further rubbing with the fingers are required.

With this process in mind it is easy to distinguish between built and wheel-made pottery among the Greek wares. In the built pottery, however careful the work, there is always a certain unevenness of outline—which indeed gives it some of its charm. Unlike the moderns, the Greeks did not continue to build pottery after the invention of the wheel. Naturally the general adoption of the wheel was not synchronous in all ceramic centers. It was used considerably earlier in Crete, for instance, than in Cyprus. But when once its convenience was thoroughly realized, the slower and more monotonous method was entirely dropped. Among Athenian black-figured and red-figured vases there are no built pieces.

(3) MOULDING

The process of moulding vases is the one most in use nowadays, for the simple reason that when once the required mould has been made the production of any number of vases is a rapid and easy task. But though commercially favored, this method is looked down upon by the artistic potter as being purely mechanical, and there is no doubt that a moulded vase has all the characteristics of machine work.

The material used for moulds nowadays is plaster. The clay can either be poured into a mould in slip form or pressed into a mould while soft and plastic. In the former process the mould or moulds are made in two or more pieces, which fit closely together leaving an opening at the top.

By pouring the clay slip into the opening, leaving it to harden a little, and then pouring out again what has not hardened, a hollow vase is formed. After due shrinkage the mould is carefully removed from the vase (fig. 36). The same mould can be used indefinitely for making vases of the same shape; it has only to be dried between one use and the next. Handles can be produced in the same way and then attached.

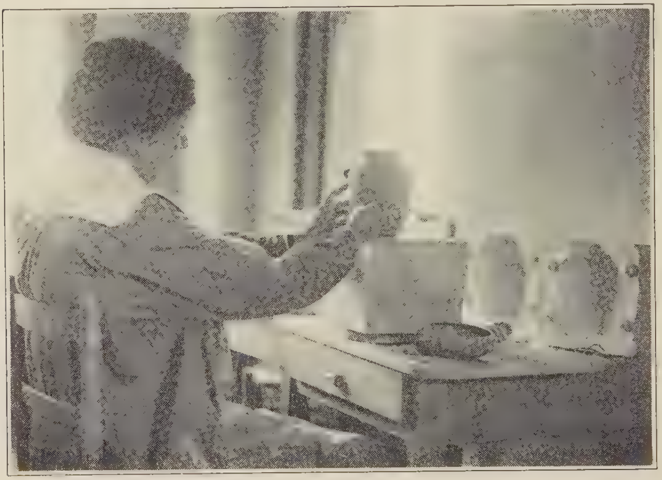

Fig. 36. Vase poured in a mould

In pressing clay into moulds each part of the mould is used separately, except where only one mould is required, as in the case of an open bowl or tile. When the clay has been carefully pressed into every part of the mould, it is left to harden, and then, upon shrinkage, can be easily separated. If the vase has been pressed in several pieces, the parts must be carefully joined and the seams effaced as neatly as possible.

The Greek potter did not use moulding as a labor-saving device. He employed it only where the work demanded it, as in the Athenian plastic ware. Here we sometimes even find the same mould used several times, as in the group of a negro and a crocodile of which chance has preserved us at least five replicas[1]; but the number of such repetitions is not great and certainly would not indicate mass production.

The material of Greek moulds was burnt clay. That the Athenian plastic vases were pressed into moulds rather than poured can be seen from the fact that the insides of these vases are rough and show finger-marks (cf. fig. 37). The joints of the two parts are clearly visible on many examples (cf. fig. 38). Often the lip was thrown separately on the wheel and attached.

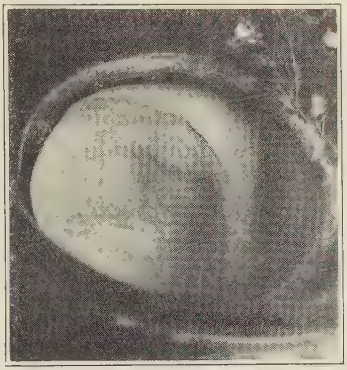

Fig. 37. Inside of moulded vase

Met. Mus. Acc. No. 06.1021.205

FIRING THE VASES

Production of Temperature.

In the fire the great miracle takes place and the dry clay, most friable and perishable of materials, becomes one of the most durable. This is accomplished by the softening of the feldspar grains which cement the whole together and thus form a dense mass. To produce the temperature at which this phenomenon takes place two things are necessary, fuel and draught, the former supplying the carbon, the latter the oxygen. The liberation of the carbon in the fuel and its union with the oxygen of the air develop combustion, during which heat is generated. Combustion can be complete or incomplete. It is complete when there is an excess of air and the carbon can combine with two molecules of oxygen to form carbon dioxide (CO_2). This condition is called oxidation. It is incomplete when there is not enough air and the carbon can get only one molecule of oxygen, forming carbon monoxide (CO). This condition is called reduction. Carbon monoxide, being very hungry for oxygen, will try to extract it from whatever source it can. If ferric oxide (Fe_2O_3) is present in the clay—which is the case in red clay—the carbon monoxide will take one molecule of oxygen from it and convert it into ferrous oxide

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[1] Cf. Buschor, Münchner Jahrbuch der bildenden Kunst, 1919, I/II, pp. 1 ff.

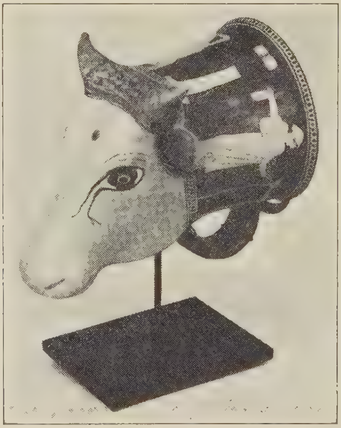

Fig. 38. Vase showing joint of two parts of mould
Met. Mus. Acc. No. 06.1021.203

($CO + Fe_2O_3 = CO_2 + 2FeO$). The important feature in this process is that ferric oxide is red and will make the clay burn red; but ferrous oxide (FeO) is black and will give the clay a blackish color. If no ferric oxide is present in the clay, that is, if the clay is not a red clay, then reduction has no effect on the color of the clay and can be freely used. In Europe potters regularly burn under reducing conditions, while in America the general practice is to burn under oxidizing conditions. When the draught in the kiln is faulty, partial reduction will often occur, and many faults in the burning, especially in the glazes, are attributable to this cause.

Fig. 39. Open kiln

We shall see presently how important is a knowledge of these chemical changes during the process of firing when we come to consider the defects on Greek vases caused by injuries in the firing (cf. pp. 44 ff.).

Types of kilns.

There are two chief types of kiln construction in use today: (1) the open kiln, in which the flame passes through the kiln chamber (fig. 39); (2) the muffle kiln, in which the flame passes around the chamber and not through it (fig. 40). In the open kiln the ware either comes in direct contact with the flame, or is stacked in saggers, i. e., boxes made of fire clay fitting one on top of the other (fig. 41). The muffle kiln is, so to speak, one large sagger, and the ware is

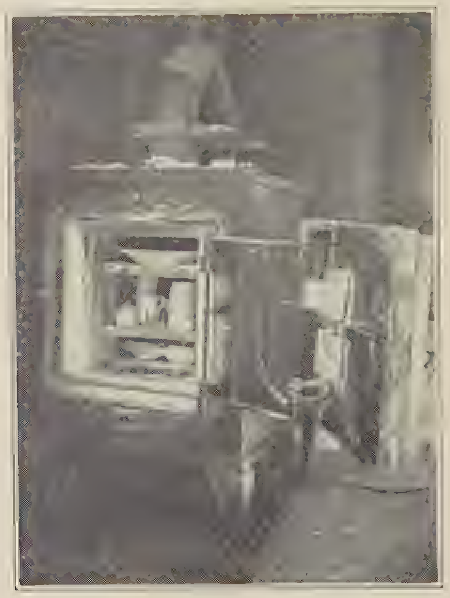

Fig. 40. Muffle kiln with biscuit ware

stacked on shelves. The draught in the kiln can be either an up draught or a down draught; in either case the air supply, as well as the fuel supply, must be under control, so that the combustion shall be as desired. The draught can be regulated by means of dampers, the fuel by attention to the burners. An arched top is an advantage, for it imparts greater strength—an important item considering the strain to which the kiln is subjected—and it facilitates the circulation of the heat. Coal, wood, gas, or kerosene oil can be used for fuel. Of these, oil and gas are now the most popular; coal and wood are rapidly coming into disuse on account of the greater labor they entail.

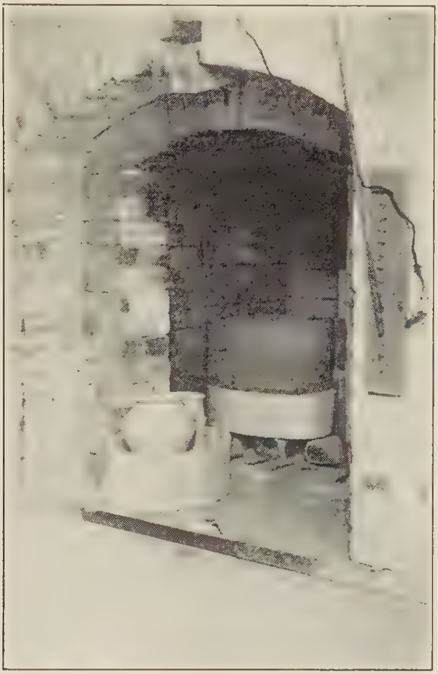

Fig. 41. Open kiln showing saggers

Packing the kiln.

In packing the kiln the ware is stacked as closely as possible for economical reasons, so that as much as possible shall be accomplished in one firing. In biscuit firing the ware can be placed so that it touches (fig. 40); in glaze firing the pieces must be separated (fig. 42) both from one another and from the bottom of the saggers or shelves on which they stand, since the melted glaze is apt to run. Glazed pieces are therefore generally placed on stilts made of burnt clay, and the marks of these stilts will often show on the bottoms of the vases.

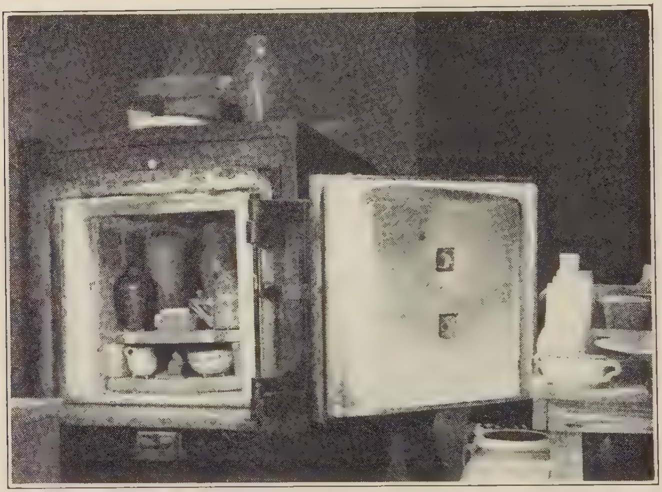

Fig. 42. Muffle kiln with glazed ware

That the chief features of modern and Athenian kilns were similar is clear from an examination of the ancient representations of kilns (cf. figs. 72-81 and pp. 76 ff.). How closely the ware was sometimes stacked is clearly seen in fig. 80. The fuel used by the Greeks was probably wood and charcoal.

Almost all modern pottery is twice fired; once for the conversion of the clay into terracotta or biscuit, and the second time for the glaze. To glaze unbiscuited ware is a delicate business, and the risk of glazing a piece of raw clay is considered larger than the trouble of burning it a second time. It is done occasionally when very tough clay is used, for instance, in kitchen crocks and in stoneware; in that case it is best to apply the glaze when the clay is in leather-hard condition, for then the absorption is less. More than the two regular firings are often used for correcting mistakes in glazing, for additional coats of glaze, and for decorating the ware.

Firing.

Different wares and different glazes require different temperatures. Thus porcelain and stoneware are fired to much higher temperatures than ordinary pottery, and salt and alkaline glazes need a higher fire to mature than the ordinary lead glazes. When the required temperature has been reached—which nowadays is determined either by means of a pyrometer or with the help of pyrometric cones which melt at a given temperature and which are watched through a spy-hole (cf. fig. 40 where the cones are set up opposite the spy-hole in the door, and fig. 42 where the cones have melted)—the fire is gradually extinguished and the kiln left to cool slowly. Twelve hours for the firing and twelve for cooling is a rough estimate for the firing of an ordinary kiln. It is important not to hurry the process of cooling, as a too rapidly cooling fire may crack the ware or affect the glaze injuriously.

The Greeks fired their pottery at a considerably lower temperature than potters do today. It seems to have been about 960° centigrade (corresponding to about cone 010) since any increase over this temperature causes a change in the color of the clay together with an additional contraction. Mr. Tonks has made the ingenious suggestion that, 950° and 1065° being the melting points of silver and gold respectively, the Greeks may have used these metals in the same way as the modern potters use cones, to regulate the heat of the kiln.[1]

When the kiln is finally opened comes the exciting moment of seeing what the fire has done with one's products. In taking out the contents of the kiln, gloves and sticks are often useful for handling ware that is still too hot to touch. Invariably there will be surprises—what one has expected to be a great success often turns out a failure, and what one thought little of may become a rare thing of beauty. In the biscuit firing the adventures of the pot are comparatively few; it may crack or sag or warp, but as a rule the expected shape is maintained. But in the glaze firing so many elements enter in that even an experienced potter can never be sure of the result. The color may turn out a different shade from that desired; the glaze may unexpectedly be matt (dull) or too glossy; it may blister or peel or crack; it may be too thin or too thick. Such defects are almost invariably due to faulty composition of the clay or the glaze or to the conditions of firing. They can often be remedied by further glazings and firings; but quite often a pot on which much time and labor have been bestowed is hopelessly ruined. A good potter, however, will soon learn to bear such mishaps philosophically; and it is certainly true that one often learns much more from failures than from successes. Moreover, the element of uncertainty lends spice to the craft.

A careful consideration of the modern processes of firing pottery described above will help us to settle the problems connected with the firing of Greek vases—for the action of fire on clay remains the same even though the kilns in use by the Greeks were probably somewhat more primitive than now.

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[1] Cf. American Journal of Archaeology, XII, second series, 1908, p. 421.

The chief problems which confront us in Athenian pottery are (1) the number of firings, (2) the interpretation of defects on Greek vases as injuries in the firing.

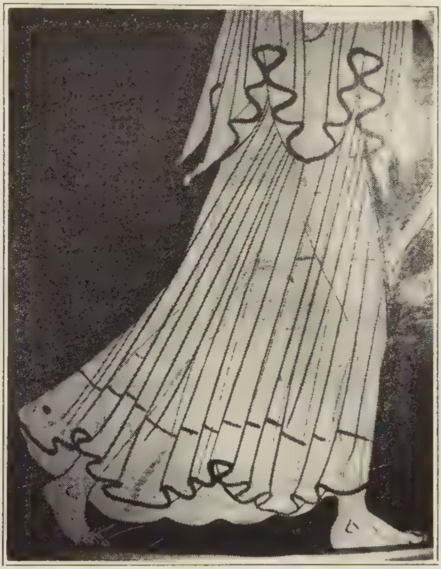

Fig. 43. Detail of amphora showing preliminary sketch
Met. Mus. Acc. No. 06.1021.114

Number of firings.

Was Athenian pottery once or twice fired?[1] That is, was it decorated in leather-hard or in biscuit condition? This has been one of the most debated questions in Greek ceramics. Archaeologists often assume offhand a number of firings,[1] but without stating any evidence or squarely facing the problems involved. Briefly, the arguments for

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[1] "Twice fired" technically means, as already explained (p. 35), once for biscuit, another time for glaze; the glazing itself may have necessitated several firings, but the piece would still be spoken of as twice fired.

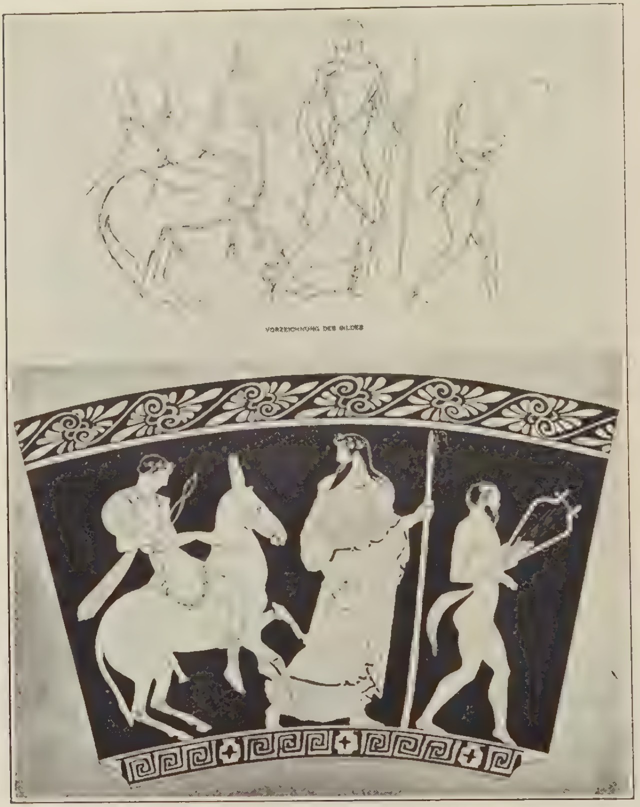

Fig. 44. Design on red-figured krater
(a) Preliminary sketch (b) Completed painting
Furtwängler u. Reichhold, *Griechische Vasenmalerei,* I, pl. VII

and against are as follows. As is well known, a large proportion of red-figured vases of good period show a preliminary, colorless sketch for the design traced with a blunt[1] instrument directly on the clay (cf. figs. 43-44). The smooth grooves of this sketch show beyond doubt that the sketch was made while the clay was in leather-hard condition, that is, before firing. If the vase had been fired, even at a low temperature, the sketch would have had to be scratched in with a sharp tool, and would have left a ragged, not a smooth line.[2] Now it is not a natural procedure for an artist to make a rough sketch for his design, and then to leave his vase to be fired before completing his work. Furthermore, an examination of the incised lines on the black-figured vases—which clearly go over the black glaze—shows also that these lines must have been made while the clay was still leather hard. The ragged edge of the glaze along the incisions has sometimes been thought to indicate that they were made after firing. But just this effect is produced by cutting through dry glaze on unfired clay; and it would have been very difficult to attain the required delicacy, swing, and smoothness by incision into hard, fired clay. Any one who will try the experiment will soon become convinced of this.[3] So that, for the black-figured period at least, this evidence points to a once-fired pottery.

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[1] Cf. e.g. Walters, op. cit., pp. 221, 222, and Herford, op. cit., pp. 13, 14. Reichhold, op. cit., p. 152, felt convinced there was only one firing.

On the other hand, it might be urged that if we assume that the decoration was executed in leather-hard condition, the vase painters whom we see depicted on Greek vases should be handling their pots with considerable care, and that this is hardly conveyed in the representations. On the Boston fragment, for instance, the painter is holding a kylix by its slender foot without any apparent fear of breaking it (fig. 67). And whoever painted the scene knew what he was doing, for he was in the act of decorating such a kylix himself. However, if the clay used by the Athenians was of a tough variety,[1] this would, I have been told by potters, be a perfectly possible procedure; and experiments made with imported Athenian clay[2] bore this out to an astonishing degree. Vases made of this clay could be handled quite freely in leather-hard condition. So that if the Athenian potter of the fifth century used similar clay to that of his present-day descendant, his handling of these pots on the vase paintings would be perfectly justified in the leather-hard state.

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[1] Occasionally a toothed instrument seems to have been used; as on the pyxis, No. 06.1117, in the Metropolitan Museum.

[2] Archaeologists' accounts are very misleading here, for some even assume that vases are in leather-hard condition after the first firing. (Cf. Herford, Handbook of Greek Vase Painting, p. 12.)

[3] E. Pottier has come to the same conclusion; cf. his Catalogue of the Louvre Vases, III, p. 674.

There is, moreover, evidence which seems to settle this question beyond dispute. On a number of the Athenian vases there are dents such as can only have occurred while the vase was still in a leather-hard state. The mark of the object contact with which caused the dent is invariably over the black glaze (cf. fig. 45), showing clearly that the glaze must have been applied in leather-hard condition.[3] In some cases we find still adhering in the dents a little burnt clay, apparently from another vase contact with which caused the accident. Here it is probable that the accident was caused not while the vase was leather hard, but when red hot in the kiln, at least in those instances, as in the black-figured amphora in the Metropolitan Museum[1] (fig. 46), where the glaze shows a rough fracture due to the separation of the two pieces which had stuck together; for this fractured edge would have become fused and smooth upon subsequent firing.[2]

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[1] The clay of Reichhold's pot, which he says could be dropped on the floor without appreciable damage (Furtwängler und Reichhold, Griechische Vasenmalerei, I, p. 152), must have been very tough indeed. Potters I have asked have never encountered clay quite as tough as that. The leather-hard vases I have handled were fit only for the dust bin when they fell on the floor—a not unusual event when learning to turn.

[2] I wish here to acknowledge the great kindness of A. J. B. Wace, director of the British School of Athens, who went to much trouble in sending me this clay. The clay sent is that used by the Athenian potters today. It is a mixed clay, composed of red earth from Chalandri and white earth from Koukouvaones.

[3] Cf. also Nos. 06.1021.114, 07.286.78, 17.230.13 in the Metropolitan Museum, and other instances quoted by Reichhold in Furtwängler u. Reichhold, Griechische Vasenmalerei, I, p. 152. If, as Reichhold assumes, the vases were actually placed in the kiln leather hard, they must have been allowed to dry for some days in the kiln before firing; otherwise they would have cracked.

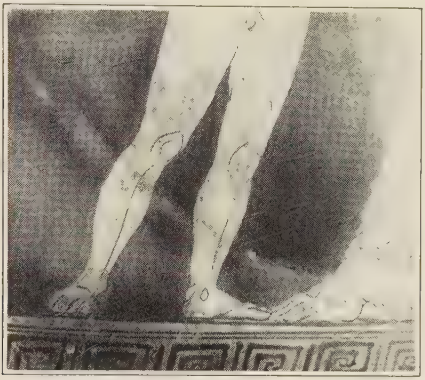

Fig. 45. Detail of hydria showing dent with mark over black glaze

Met. Mus. Acc. No. 17.230.15

The fragments of unfinished vases which have been found from time to time[3] have been used as evidence to prove several glaze fires; for they show fired vases at a definite stage in the glazing, the outlines and inner markings painted, but the background not yet filled in. Must we, then, suppose that it was the regular practice—at least in the later red-figured period to which all the unfinished pieces belong—to fire before and after the painting of the background? It is difficult to see what would be gained by the process.

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[1] Cf. also Furtwängler u. Reichhold, loc. cit.

[2] This is Mr. Binns's explanation.

[3] Five are listed by Hartwig, Jahrbuch des deutschen arch. Instituts, XIV, 1899, p. 164, note 21, one in Athens, one in Sèvres, one in Würzburg, one in Berlin, one in Bonn. A sixth piece is a fragmentary kylix in the Metropolitan Museum, No. 11.212.9, and a seventh one, the cover of a toilet box, in the British Museum, Room of Greek and Roman Life, No. 426.

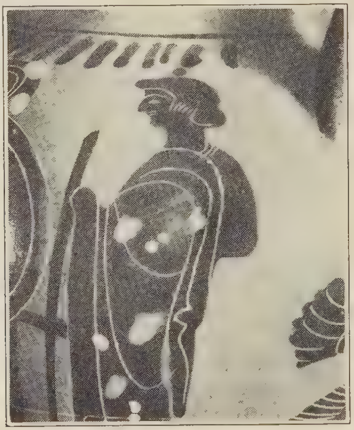

Fig. 46. Detail of amphora showing dent with clay from other body still adhering

Met. Mus. Acc. No. G.R.530

If the pottery were fired before any decoration was applied, there would be the advantage of safer handling of the ware; but to have an extra firing with the decoration more than half completed gives no apparent gain and there is the distinct disadvantage of the extra expense of firing.

The unfinished kylix in the collection of the Metropolitan Museum may shed light on this problem (fig. 47). It is not so fragmentary as the pieces in the other museums, being complete except for portions of the rim. The foot is very roughly turned (fig. 48), very different from the average kylix foot, as if it had not been worth while to spend much time on this product. The decoration itself is also quite cursory. This suggests that the piece was merely a "test," such as potters use often nowadays for making trials of their clay body, or their glaze, or their kiln. The kylix is, as a matter of fact, too soft fired, and the glaze has turned reddish in parts. May we be permitted the guess

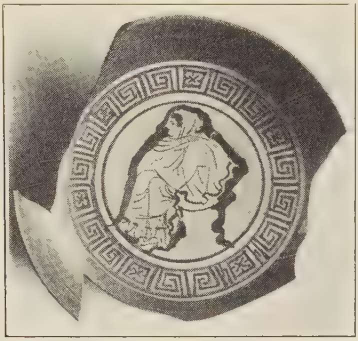

Fig. 47. Unfinished kylix
Met. Mus. Acc. No. 11.212.9

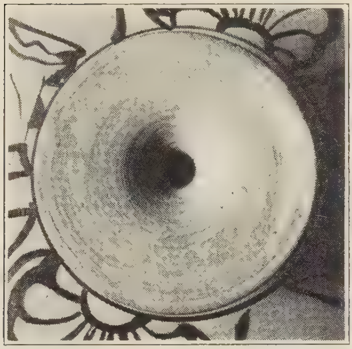

Fig. 48. Foot of unfinished kylix
Met. Mus. Acc. No. 11.212.9

that this was a trial to test out a new kiln? It is only a possibility and there are many others. The important point is that the evidence of the unfinished fragments does not make it necessary to assume more than one glaze firing.

The probability, therefore, is that Athenian pottery is once fired,[1] all ornamentation—both glaze and accessory colors[2]—being applied while the vase was in leather-hard condition; for in the case of the accessory colors also there would have been no advantage in an additional firing.

Injuries in the firing.

The action of the fire on the potter's products was apparently as much an open question in Greek times as it is now. Practical experience must have gone a long way then as today; but full control could not be achieved. In forming an estimate of what proportion of the pottery was spoiled in the kiln we must remember that in our museums we are apt to encounter the survival of the fittest—what the potter considered worth preserving, what the Greek client deemed adequate to his need, and what the modern museum curator considers good enough for exhibition. But even in this selection we meet with a number of kiln mishaps, which apparently were so common that they were hardly noticed. When our eyes have become trained to observe such things, we shall note that in any collection of Greek vases there are many cases of warping and sagging, especially in the overhanging lips of the hydriai and amphorai.[3] There are many cracks and dents,[1] many faults in the glaze. A very conspicuous fault is the change of the clay from a pink to a grayish color.[2] Archaeologists often explain this as due to over-firing.[3] The real reason is not that the temperature has been too high, but that the clay has been subjected in the kiln or in the funeral pyre, to fumes the carbon of which has been absorbed by the clay. In other words, there was either reduction and the red ferric oxide in the clay has been changed to black ferrous oxide (cf. pp. 30 f.), or the clay has absorbed the black carbon physically. When controlled, this change is very useful to the potter for obtaining certain effects. Thus bucchero pottery is simply red clay fired under completely reducing conditions; and in the Vasiliki mottled ware some carbonaceous pigment like tar was probably placed on the spots which were intended to be black, whereupon the carbon would be absorbed by the clay and the iron reduced.[4]

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[1] An interesting parallel is furnished by Chinese porcelain for which, Mr. Bosch Reitz tells me, there is clear evidence that it is once fired.

[2] It is sometimes assumed that the accessory colors—purple and white—were not fired and that this is the reason why they are less well preserved and dull instead of shiny like the black glaze. That they were fired is shown by the discoloration of the black glaze beneath the white or purple. They are neither shiny nor durable for the simple reason that they are not a glaze but earth colors.

[3] Cf. e.g. No. 06.1021.114, in the Metropolitan Museum.

The commonest injury to the glaze in the fire is its change into a brilliant red instead of the intended black. This can be observed on many vases, sometimes as a large spot (cf. fig. 49), other times as a less clearly defined variegation.[5] The cause was irregularity of fire, a jet of air passing through the kiln coming in contact with parts of the vases.

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[1] Cf. e.g. Nos. G. R. 530, 06.1021.82, 06.1021.114, etc., in the Metropolitan Museum, and No. 379 (Salle G) as a conspicuous example in the Louvre.

[2] Cf. e.g. Nos. 07.286.47, 07.286.81, and C. R. 541 in the Metropolitan Museum.

[3] Cf. e.g. Reichhold in Furtwängler u. Reichhold, Griechische Vasenmalerei, I, p. 153.

[4] This is Mr. Binns's explanation. He does not consider that the accidental piling together of glowing coals could account for the carefully designed effects in the Vasiliki ware; so that Mr. Seager's ingenious theory (cf. Hawes, etc., Gournia, p. 50) would have to be given up.

[5] Cf. e.g. 11.212.7, 12.336.1, G. R. 54, G. R. 1229, 06.1021.120, 06.1021.191, 12.229.15, etc., in the Metropolitan Museum.

In other words, there was an excess of oxygen (or the reverse of reduction) which turned the black ferrous oxide of the glaze into red ferric oxide.[1]

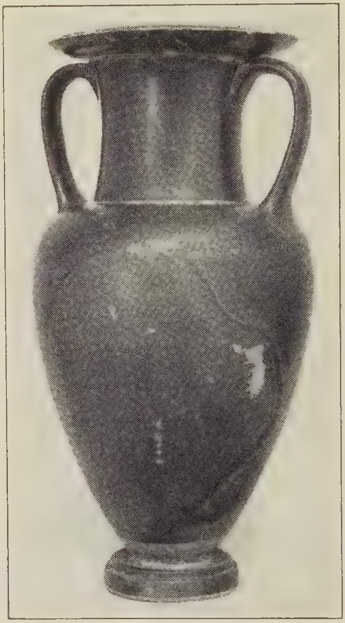

Fig. 49. Black-glazed amphora with large red spot on one side
Met. Mus. Acc. No. G.R.607

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[1] This explanation is also that offered by Reichhold in Furtwängler u. Reichhold, Griechische Vasenmalerei, I, p. 153. It is to this same cause that I should be inclined to attribute Reichhold's ''Lagerringe,'' round red spots or black spots surrounded by red rings (op. cit., p. 154). Supports such as he describes which came into direct contact with the glaze are inconceivable; the glaze would have stuck to them and serious injury resulted. Furthermore, Athenian vases must have been placed in the kiln standing on their feet, and for this purpose the under surfaces of the feet are left unglazed so as to prevent the glaze from sticking. If placed in the positions Reichhold suggests, the vases would have been apt to warp, and no potter would run such risks.

Such red spots caused by jets of air coming in contact with the vases must not be confused with the very similar red spots which are due to the wearing off of the black glaze and the exposure underneath it of the ochre-tinted clay (cf. p. 58). Examination with a magnifying glass will show the difference: in one case the red is part of and level with the black glaze, in the other it is on a layer beneath the black glaze; in the former case the red will not come off when rubbed, in the latter it will.

GLAZING

Besides shaping and firing a vase, a potter must understand the art of glazing, to many the most alluring part of the craft; this comprises both the preparation of the glaze and its application to the pot. A glaze is a chemical compound, known as a silicate, which upon firing becomes a glassy substance. It has three chief ingredients: (1) an oxide of lead, of lime, of alkali, etc., which forms the foundation of the glaze; (2) alumina and boron oxide, which regulate the behavior of the glaze in the fire; and (3) silica, which controls the fitting of the glaze to the body. Modern glazes are divided into two chief categories: lead glazes and leadless glazes. Of these the former are by far the more numerous; but alkaline glazes, tin enamels, etc., are also used, especially in studio potteries.

In the preparation of a glaze the ingredients have first to be weighed out carefully in the required proportions; the mixture has then to be ground with water and sieved; and when the right thickness is attained (usually about the consistency of cream), the glaze is applied to the vase, which should first be soaked in water to saturation to prevent too rapid absorption. Gum tragacanth is used as a binder to make the glaze stick.

The glaze can be applied in various ways—by dipping (fig. 50), by pouring (fig. 51), by the use of the brush (fig.

52), or by spraying (fig. 53), the method depending chiefly on the individual choice of the potter. To apply a glaze properly to the clay body is a great art, and upon it, as much as on the preparation of the glaze, final success depends. The glaze mixtures when applied are whitish or grayish; it is only after firing that they assume the wonderful range of colors which delight us so much today.

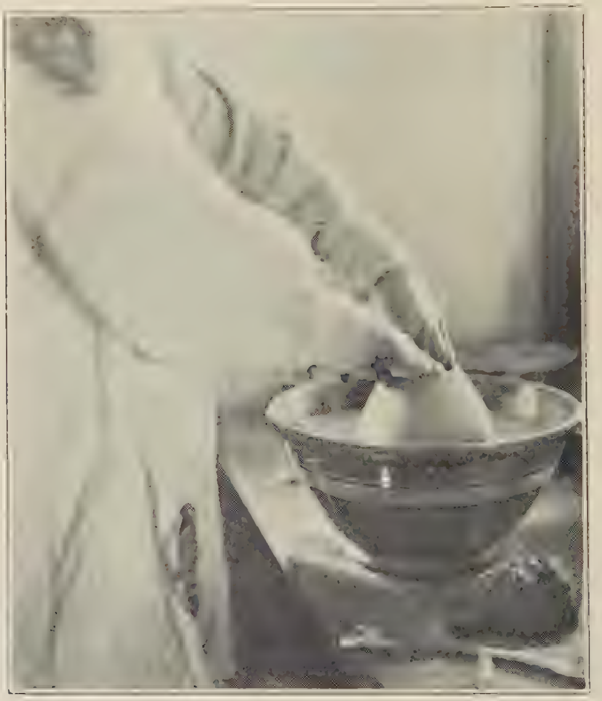

Fig. 50. Method of glazing: dipping

The Athenian potter had no ambition to produce brilliant color effects in glazing. He was content with the one variety which he had brought to perfection—a thin, luminous glaze of a deep, velvety black color and of astonishing durability. After generations of experiments we cannot yet say that we can successfully imitate it. Its composition is, however, no longer a secret. It has been shown by analysis and synthesis that the chief component parts of the glaze are an alkali (potash or soda), a clay (which would contain some silica such as flint naturally), and ferrous oxide.[1] The exact proportion of these parts, and

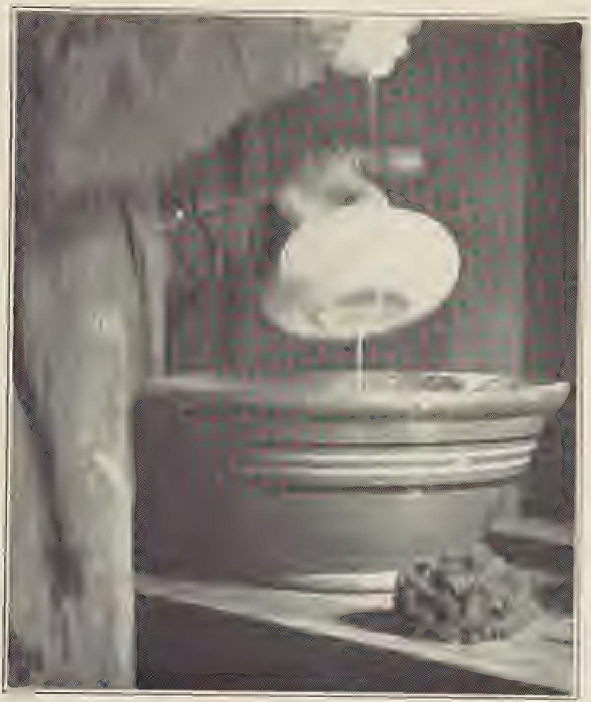

Fig. 51. Method of glazing: pouring

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[1] Cf. Salvétat in Brongniart, Traité des arts céramiques, I, p. 550; and Tonks, Black Glaze on Greek Vases, American Journal of Archaeology, XII, second series, 1908, pp. 420 ff. Mr. Binns in a series of experiments has come to the same conclusion.

above all the manipulation of the glaze are still unknown. At least, nothing completely corresponding to the Greek glaze has as yet been produced, though Mr. Tonks[1] and especially Mr. Binns[2] have come very near it. Whether the secret lies in the proportion, in the medium used for binder,[3] or in some undiscovered element one cannot tell. It is only certain that when the discovery is made, as doubtless it must be, it will be of great import both to archaeologists and to modern potters.

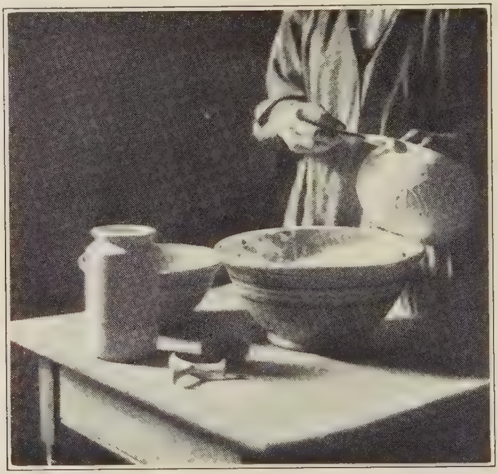

Fig. 52. Method of glazing: use of the brush

The glaze was, as I have endeavored to show (cf. pp. 37 ff.), applied to the vase in leather-hard condition. At that stage the clay still contains enough water to prevent too rapid absorption, and the glaze, therefore, runs in an easy, flowing manner.[1] To carry out his work the painter could take his time, for, as we have seen (cf. p. 16), a vase can be kept leather hard for an indefinite period by the simple device of placing it in a damp box, that is, an air-tight case with a pan of water at the bottom.[2]

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[1] Cf. American Journal of Archaeology, XII, second series, 1908, pp. 423 f.

[2] Mr. Binns's experiments are as yet unpublished.

[3] Under Mr. Binns's direction I tried gum arabic, honey, water glass, glue, white of egg, glycerine, and oil as binders, but none gave complete satisfaction.

How did the Greek painter apply the glaze to his pottery? We know that on the broader surfaces the brush was used, for brush marks are clearly visible in many cases.[3] When possible the backgrounds and horizontal bands were painted while the piece was rotating on the wheel; where a panel had to be reserved, the irregularity of free-hand brush work

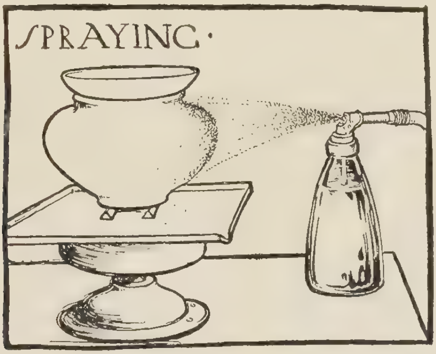

Fig. 53. Method of glazing: spraying

Cox, *Pottery for Artists, Craftsmen and Teachers,* p. 111, fig. 51

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[1] H. B. Walters in his Ancient Pottery, I, p. 212, says that the glaze runs best on a surface already baked. As a matter of fact, to make glaze run at all on the baked surface, the biscuit has to be soaked in water.

[2] Reichhold in Furtwängler u. Reichhold, Griechische Vasenmalerei, I, p. 152, forgets this when he argues that since the decorations were applied on leather-hard clay they must have been executed within a few days.

[3] Some archaeologists even claim that they have noticed hairs of brushes in the glaze. It is, however, impossible that these are hairs from the brushes with which the glaze was painted, as they would have burned up in the fire to which the glaze was subjected.

can readily be observed (fig. 54). For the "flat" glaze lines, in both the figured scenes and the ornamental motives, smaller brushes were employed. But what was the instrument which produced the famous "relief" lines, that is, those fine lines which stand out perceptibly from the surface and which were used for the contours and inner markings of the figures during the best red-figured period (fig. 55)? The quality of these lines has been justly admired by all who have studied them and it has been thought that the instrument used had much to do with the result.[1] After a number of experiments with fine brushes, single bristles,

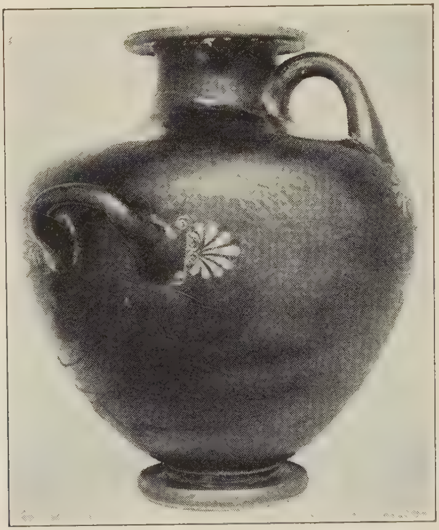

Fig. 54. Hydria showing brush marks

Met. Mus. Acc. No. 11.212.7

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[1] Cf. e.g. the discussions by Hartwig, Jahrbuch d. Instituts, XIV, 1899, pp. 147 ff.; Reichhold, in Furtwängler u. Reichhold, Griechische Vasenmalerei, I, Text, pp. 148 and 230; Tonks, American Journal of Archaeology, XII, second series, 1908, p. 425; Walters, Ancient Pottery, I, pp. 227 ff.

reeds, feathers, pens, etc., I have come to the conclusion that it is of little avail to discuss the instrument used before we can employ in our experiments a glaze identical with the Greek. For to get the wonderful flow of the Greek line, the glaze must run much more easily than any imitation black glaze which we have so far produced. The groove which runs down the middle of the relief lines hardly affords a clue; for slight pressure of any instrument seems to produce such a result.

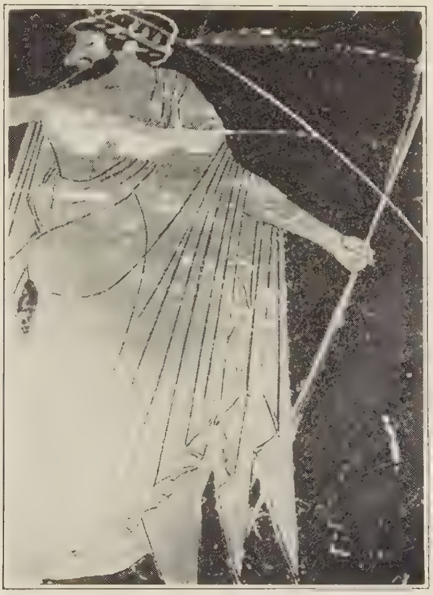

Fig. 55. Detail of psykter showing relief line

Met. Mus. Acc. No. 10.210.18

RED OCHRE WASH

In three statements of ancient writers the addition of red ochre to Athenian pottery is referred to.[1] In Pliny, Natural History, XXXV, 152, we read: Boutades inventum est rubricam addere aut ex rubra creta fingere, "Boutades first added red ochre, or made pottery of red clay." Isidorus, Etymologiae, XX, iv, 3, speaks of pottery vases having been first invented at Samos and then adds: Postea inventum et rubricam addere et ex rubra creta fingere, "a later invention was to add red ochre and to make pottery of red clay." Suidas in his lexicon, where he describes Cape Kolias as a place in Attica where pottery is made, says that the clay from that region is the best, and adds: *ὥστε καὶ βάπτεσθαι ὑπὸ τῆς μίλτου*, "so that it is also dyed with red ochre."

Archaeologists have assumed that this red ochre was mixed with the clay and that to it was due the deeper color of Athenian ware as compared, for instance, with the geometric. Thus in practically all our books on vases the preparation of the clay for the manufacture of Athenian vases is described somewhat as follows: "The clay having been thoroughly purified and washed, was then kneaded and brought to a consistency suitable for shaping it on the wheel. It was at this stage that other substances, chiefly a red earth (ochre=*μίλτος*), were worked in with the clay to deepen the color." First of all, it should be noted that if ochre is to be added to the clay it must be done long before the kneading stage, otherwise the red ochre will of course not mix evenly. The best time would be when the clay is dry, so that a definite proportion could be weighed out. But that is too obvious to need discussion. The question is, Does the addition of red ochre materially change the color of the clay? It may be interesting in this connection to record my experience in the matter. About three years ago I was asked to speak at a convention of modern potters meeting at the Metropolitan Museum of Art, on the subject of Greek vases. I thought that these potters would probably be specially interested in the technical side of Greek ceramics, and with the courage of ignorance I described in detail our theories regarding the manufacture of Greek pottery. It was the questions which the potters asked me afterwards which convinced me that it was time I went to a pottery school. One of my statements which aroused considerable interest was this theory that red ochre was added as an ingredient to deepen the color of red clay. Several men came to me after the talk and said, "I don't see why the Greeks did that; for by just slightly raising the temperature they could easily have deepened the color." I had no answer then, but when I went to the pottery school I thought I should take nothing for granted, but convince myself by making my own experiments. So I made some tests, adding certain percentages of ochre to see how it would affect the color. Apparently the ochre had little effect, and the pieces with and without ochre were about equally pink when they came out of the kiln. I then burned some pieces without any ochre to a little higher temperature and the red was considerably deepened. I was quite convinced then that the ochre added as an ingredient to the clay would not have the desired result; besides, if we needed further proof we might remember that analyses made of Athenian clay have shown no trace of ochre.[1]

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[1] For full quotations of these statements cf. pp. 97, 98.

What, then, do Pliny and Suidas mean when they speak of the addition of red ochre to Athenian pottery? A number of archaeologists have observed from time to time that Athenian vases, especially of the late red-figured period, show traces of a reddish pigment applied over the surface. Reichhold in his technical description of vases in Furtwängler und Reichhold, Griechische Vasenmalerei, frequently refers to it as "rötliche Lasur."[2] Pottier ascribed it to a sort of varnish or lustre applied over the surface of the decorated, fired vase which on decomposition precipitated into a red deposit.[1] Walters thought that red ochre was rubbed on certain parts of the vase which had remained too pale after baking.[2] A detailed examination of the vases in many European and American museums convinced me that the use of this red pigment was quite general throughout the red-figured period, and to a limited extent in the black-figured period. On a few vases it appears in excellent preservation.[3] The majority of red-figured vases of all periods[4] and a few of the black-figured vases[5] show traces of it. When it is not otherwise visible, it can often be detected in the slight depressions of the preliminary sketch, or under the handles, or on the under side of the foot. As the color comes off when rubbed with a damp cloth, it is not surprising that it is not better preserved, after the extensive cleaning that most museum specimens have undergone. But the many traces which are still preserved can only be satisfactorily explained by assuming that it was the general practice—at least in the red-figured period—to apply a red pigment over the whole surface of the vase.

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[1] Cf. John, Malerei der Alten, p. 173.

[2] Cf. e.g. vol. I, pp. 140, 145.

In the light of this experience let us again examine what Pliny and Suidas say. Pliny's statement is sufficiently vague to make any interpretation possible; but Suidas' use of the word *βάπτεσθαι*, "to be dipped," is illuminating. The clay could not have been "dipped" in a powdery or liquid state, the only way of having the ochre become an actual ingredient in the clay. The term *βάπτεσθαι* implies that the clay must have become a solid vase, in which case the ochre was applied only on its surface. Indeed Athenaeus (480 E) uses the term *βάπτεσθαι* to signify the "glazing" or "silvering" of earthen vessels. So that literary testimony

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[1] Cf. e.g. Pottier, Catalogue des vases antiques du Louvre, III, p. 682.

[2] Cf. e.g. Walters, Ancient Pottery, I, p. 218.

[3] Cf. e.g. in the Museum für Kleinkunst, Munich, the kylix with Dionysos by Exekias, No. 2044, and the Euphronios kylix, No. 2620. These give us an excellent idea of the original appearance of Athenian vases.

[4] Cf. especially in the British Museum, E178, E149, E282, E382; and in the Metropolitan Museum, G. R. 604, 07.286.73, 07.286.74, 06.1021.108, 12.236.2, 07.286.65, G. R. 589, 06.1021.121, G. R. 573, 17.230.13, where extensive traces can still be seen.

[5] Cf. e.g. in the British Museum, B.439, B.516, B.592, B.446; Metropolitan Museum, 06.1021.56, G. R. 555.

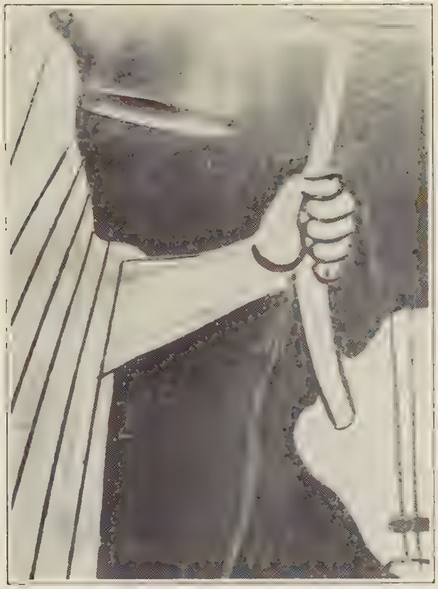

Fig. 56. Detail of amphora showing diluted black glaze line (on arm) going over red ochre left in preliminary sketch line

Met. Mus. Acc. No. 12.236.2

seems to agree with the evidence of the vases themselves that the ochre was applied on the surface. At what stage, then, was this ochre added? Was it before or after the black glaze? Careful examination has shown that it was previous to the glazing. When the black glaze is chipped off it generally takes the surface too, so that instances of the red ochre showing underneath are not numerous; but there are nevertheless a number of undoubted examples.[1] An especially convincing instance is on an amphora in the Metropolitan Museum in which a diluted black glaze line goes clearly over traces of the red lift in a preliminary sketch line (fig. 56). Furthermore, in many cases the glaze on the background surfaces has disintegrated and shows the red ochre beneath.

Since the black glaze was probably applied to the leather-hard clay, the ochre wash must also have been added in that state. The leather-hard vase might have been dipped in an ochre solution or the ochre applied with a brush or rubbed into the surface as a powder. In order to make it adhere properly to the clay actual experiments have shown that by far the best results are obtained by giving the surface a good polish after the application of the ochre. The ochre is thereby actually incorporated with the clay and forms a good firm surface. If not so polished, it is powdery after firing and comes off easily.

Experiments further showed that (1) red ochre applied in this manner on the red clay in leather-hard condition produced an effect identical with the red "wash" observable on the Athenian vases; (2) preliminary sketch lines engraved lightly with a blunt tool did not remove the ochre; (3) the ochre in no way interfered with the adhesion of the black glaze over it; (4) the ochre came off only a little at a time even when rubbed hard while wet. It is therefore only during the long processes of wear and time that the red ochre application has worn off. But even when it has entirely disappeared, it has stained the clay a deeper color—namely, the orangey hues which we see now; for the actual color of the clay is lighter and pinker, as any fracture will show.[3]

[1] Cf. e.g. British Museum, E.74, E.72, E.307, E.382, E.149, E.333.

[2] Such red spots must not be confused with those caused by excess of oxidation in the firing (cf. pp. 44 ff.).

[3] Imported Athenian clay (cf. p. 40) fired to the temperature to which the ancient Greeks fired their pottery was so light and characterless in color that some process to deepen the hue would appear almost imperative.

Originally, however, we learn from our investigation, the red-figured Athenian vases had an even deeper and richer tint than they have now—approaching more nearly the color of copper. The general effect, therefore, must have been considerably more vivid than it is today, and to some this thought may not at first appeal. But we should remember that we are discovering also in other fields that the Greeks loved bright, intense color, not the faded tints that so many of their works present today.

WERE ATHENIAN VASES MADE FOR EVERY-DAY USE?

The theory has often been advanced that the painted black-figured and red-figured vases were made for decoration and for votive and funeral purposes, but not for actual use. Percy Gardner in his Grammar of Greek Art (p. 160) holds this view and gives as his reason that the painted vases were too fragile to be easily handled and too porous to contain liquid. Reichhold in Furtwängler und Reichhold, Griechische Vasenmalerei, Text, I, p. 82, and Skizzenbuch griechischer Meister, p. 10, is of the same opinion, and bases his assumption on the fact that a number of the vases show ancient rivet marks and could not therefore have served any practical purpose in such a condition; also that no ancient vases show signs of wear, which would have been unavoidable if they had been in daily use. Does our investigation of the technique of Athenian vases help to settle this question? Let us look first at the case in its broader aspects.

Nobody can work long with Greek vases or other forms of Greek industrial art without being impressed with the wonderful combination of beauty and practical utility which these objects show. The Greek vases are not only finely proportioned, but each one is admirably adapted to its purpose. We need only try pouring from an oinochoë to see how easily the liquid flows without any danger of spilling; or from a lekythos to see how the oil trickles through the narrow neck, drop by drop, or in a very thin stream, just right for cooking or the making of salad dressing. We need only drink from a kylix to realize how, contrary to expectations, it is an easy and delightful process —the little curve of the rim preventing the liquid from spilling down one's cheeks.[1] We need only closely observe the handles of Greek vases to see how their positions, their curves, and above all their extraordinary solidity render them eminently practical. Moreover, the study of a hundred little details, the forms of the knobs on pyxides, the projections for holding the lids in place, the outward or inward curves of the lips, the substantial feet, all combine to form overpowering evidence that these vases were designed for actual use. It is only in isolated instances, such as the loutrophoroi which have no bottoms or the white lekythoi which have no connection between the neck and body, that this rule does not hold good. Such vases, however, belong to clearly defined classes evidently made as votive offerings or as tomb furniture.

That the bulk of vases were made for votive purposes, there is no real evidence. Among the many sixth- and fifth-century inscriptions recording such offerings there are few relating to pottery vases. Nor is it conceivable that these vases were purely ornamental. We know that private houses in Athens were at that period excessively simple, consisting mostly of a courtyard and a few rooms opening on it, so that it is not likely that people surrounded themselves with a lot of useless ornaments; nor can we believe that in a period which, at least in the sixth century, was still one of strenuous endeavor, these vases were exported to all parts of the world merely as decorative bric-à-brac. Everything we know of Greek life at that time points against such an assumption. Moreover, if the Greeks had such decorations in their homes we should expect to see, depicted in the vase paintings, cabinets or shelves with vases displayed on them; instead, when vases are shown, they are invariably in actual use, or hanging on a nail on the wall, ready for immediate service.[1]

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[1] Many modern imitations of kylikes lack just this feature, which makes drinking out of them a very different story.

There is another consideration. Even if, from our modern point of view, we may hesitate to believe that a beautiful cup of Euphronios was used merely as a drinking vessel, where are we to draw the line? Any one who has worked in a museum or has excavated on fifth-century sites knows that besides the selected specimens exhibited in museum cases there are a large number of inferior examples, hastily decorated, which could hardly have been displayed as ornaments, but which are open to the same objections raised against the vases of better workmanship.

And now let us examine these objections. First, the vases are supposed to be too porous to contain liquid. The fineness of the clay, the polish which was imparted to it, and perhaps the application of the ochre tended to reduce this porosity somewhat. In the course of time the deposit left by wine and oil would still further close the pores. In any case, experiments show that Athenian vases do hold liquids without any difficulty. The unglazed portions become damp, and a damp mark is left on the table if the foot is not glazed; but in the days before highly polished furniture there was no strong objection to that, and there was on the other hand a very real advantage. For it allows a certain amount of evaporation which would tend to cool the liquid—a very desirable thing in a warm climate without a regulated ice supply. Any one who has tried the experiment of keeping water in an unglazed jar in a warm room has found that the evaporation keeps it delightfully cool. In southern Europe today liquids are kept in that manner during the summer. We must also remember that a large number of the early wares from the Bronze Age down, as well as the commoner wares at all times, are either wholly unglazed or have unglazed portions. And surely nobody wants to contend that these vases were not manufactured for use.

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[1] Cf. Antike Denkmäler, II, pl. 8; Journal of Hellenic Studies, XII, 1891, pl. XX, and XXXII, 1912, pl. VII; Furtwängler u. Reichhold, Griechische Vasenmalerei, I, pls. 19 and 24, III, text, p. 19, fig. 7; Notor, La femme dans l'antiquité, p. 253; Wiener Vorlegeblätter, 1889, pl. XII (on Ficoroni cista); Hartwig, Griechische Meisterschalen, pl. LXVII, 3a and 4, pl. LXIX, 2a-c; Daremberg et Saglio, Dictionnaire IV, part 2, p. 1160, fig. 6252; etc.

The objection that Athenian pottery is fragile is easily disposed of. Actual handling of the vases will show that they are anything but fragile, in fact that they are remarkably strong. All those portions which would get special wear, such as handles and rims, are almost always stoutly made, more so than much of the china and earthenware and glass we use today. Occasionally, of course, we get a very thin and delicate example; and that would have to be handled with special care.

Then, as regards the question of wear. Terracotta is, as a matter of fact, one of the most indestructible materials we have, and especially so when glazed. Glazed earthenware, consequently, even though in constant use shows little trace of wear. What little we should expect, a close inspection of Athenian vases will reveal. The black glaze, even when perfectly preserved on the exterior, is much worn on the interior of stamnoi or kraters (cf. fig. 57), where the liquid came in constant contact with the glaze, and the unglazed interiors of amphorai and hydriai are certainly not perfectly fresh and unused looking. It is also noteworthy that finely and poorly decorated vases are in the same condition in this respect. A comparison with the Corean pottery of the Korai period, 935—1392 A. D.,[1] which is known to have been made to serve merely as tomb furniture, is helpful.

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[1] Cf. e.g. Metropolitan Museum, Nos. 15.160.2-3, 19.39.20.

The fresh and clean insides of these vases offer a very different appearance from that of the discolored interiors of Greek amphorai and hydriai—a clear proof that the Athenian ware did not serve the same unutilitarian purpose as the Corean.

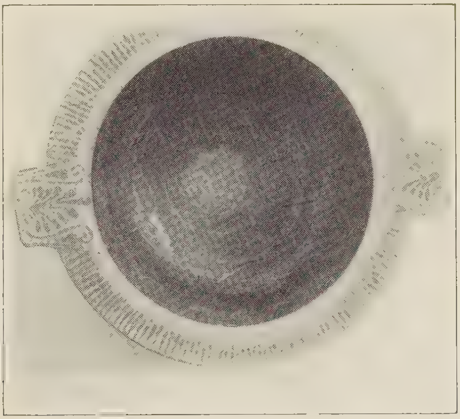

Fig. 57. Inside of krater showing extensive wear

Met. Mus. Acc. No. 07.286.74

Lastly, regarding the argument about riveted vases, it is surely natural now and then, instead of throwing away a broken pot, to have it put together and make the best of it in its mended state. We do the same thing nowadays. At all events, the vase could still have been used to contain dry materials. Such Athenian vases with ancient rivet marks are in any case infrequent, and do not compare in number with the broken vases which have not been mended.

Such considerations should once for all explode the theory that Athenian vases were not actually used; so that we can think of them, in the way that appeals to our imagination, as serving in the daily life of the Athenians and as adding to the enjoyment of that life, both by their beauty and by their usefulness.

II. REPRESENTATIONS OF ANCIENT POTTERS

AN important source of knowledge for the technique of Greek vases is supplied by the representations of ancient potters at work and by potter's implements which have survived. It may be interesting to review these and see what new interpretations experience at a modern pottery school will suggest.

FASHIONING THE VASES

1. *Black-figured hydria in Munich.*

Furtwängler u. Reichhold, Griechische Vasenmalerei, I, Text, p. 159. Jahn, Beschreibung der Vasensammlung in der Pinakothek zu München, No. 731.

An Athenian pottery establishment. To the left a man sits on a stool and is holding with both hands an amphora on his lap; a boy (only the head and one hand are preserved) is standing before him, placing one hand on the body of the vase; the latter is painted black, that is, it has

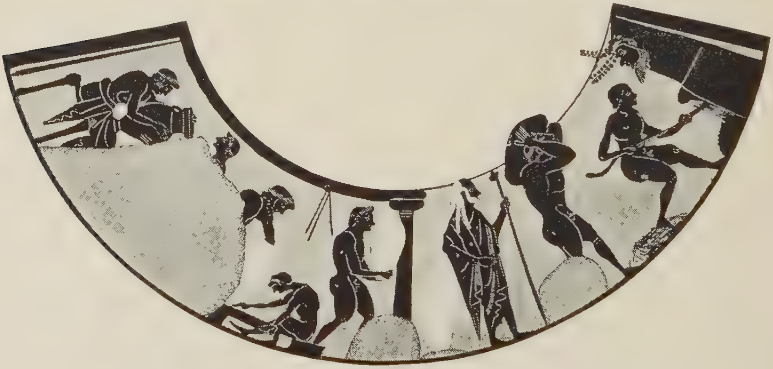

Fig. 58. Athenian pottery establishment

Furtwängler u. Reichhold, *Griechische Vasenmalerei,* I, Text, p. 159

already been glazed. The man has the air of inspecting it, while the boy is apparently helping him hold it (since it is still in leather-hard condition, it requires careful handling). The next group represents a man throwing a tall vase on a wheel; a boy is sitting before him on a low stool, turning the wheel with both hands at whatever speed is required. The vase is so tall that the entire forearm of the potter is inserted; while his other hand (now missing) was doubtless placed on the outside of the vase, so that by the pressure of the two hands the pot might acquire the necessary form and thickness. The vase is painted white to show that it is as yet unglazed. A pair of calipers is hanging on the wall ready for use, to enable the potter to check the heights and widths of his products. To the right a youth is carefully carrying away a vase that has just been thrown, to dry. A similar vase is already standing on the other side of a column, drying in the open air or in a court. Both vases are painted white to indicate their unglazed condition. Next we see an old man walking leisurely with a stick. His dignified air is in strong contrast to the busy absorption of the workmen. He is evidently the overseer or proprietor of the pottery. To his right a tall youth is carrying a heavy weight on his back, apparently a sack of charcoal. He is bringing it to the kiln, which is being stoked by the fireman. The kiln has a satyr head at the top to avert the evil eye and protect the pottery from all danger during the firing.[1]

2. *Fragment of a Corinthian pinax in the Berlin Museum.*

Antike Denkmäler, I, 1886, pls. 8, 17.

Furtwängler, Beschreibung der Vasensammlung in Berlin, I, No. 869.

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[1] It is interesting to compare in this connection the satyr heads on shields, perhaps intended to frighten the enemy (cf. Gerhard, Auserlesene Vasenbilder, pl. CLXXXVIII; Micali, Storia degli antichi popoli italiani III, p. 63, pl. 41, 1-3).

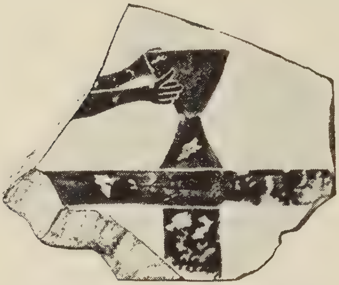


Fig. 59. Potter throwing

Antike Denkmäler, I, pl. 8, No. 17

A potter throwing a vase on a wheel, with both his hands placed on the outer surface; only the two hands of the potter and the upper part of the wheel with the vase are preserved.

3. Red-figured fragment from the Akropolis in Athens.

Athenische Mittheilungen, XIV, 1889, p. 157.

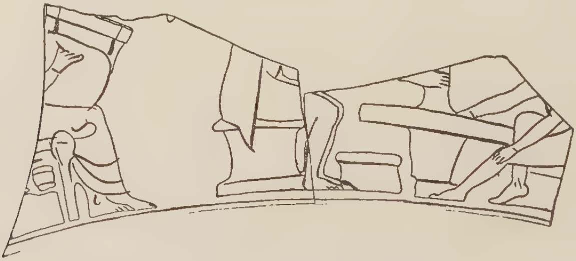


Fig. 60. Potter throwing

Athenische Mittheilungen, 1889, p. 157

A potter is sitting on a stool and throwing a vase on a wheel which is being propelled by a boy; another man sits behind him with a krater on his lap.

4. *Interior of a black-figured kylix in the British Museum.*

British Museum, Guide to Greek and Roman Life (2d edition), 1920, p. 182, fig. 218.

Walters, Catalogue of the Greek and Etruscan Vases, II, B.432.

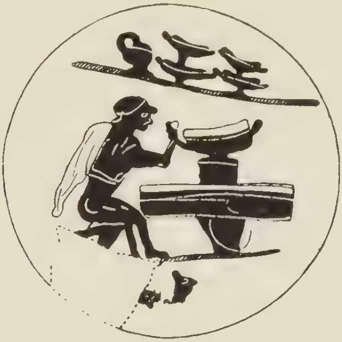


Fig. 61. Potter attaching handles

British Museum, *Guide to Greek and Roman Life* (2d Edition), p. 182, fig. 218

A potter is sitting in front of his wheel on which a kylix is standing. He is apparently engaged in attaching the handles. On a shelf above are piled some more kylikes and a jug. The whole is very roughly painted.

5. *Corinthian black-figured pinax in the Museum of the Louvre.*

Gazette archéologique, VI, 1880, p. 106, 3a.

A potter is sitting before his wheel propelling it with one hand. He is working on what appears to be a one-handled jug. He is not "throwing" or "turning" it, since it already has its handle attached. Perhaps he is incising horizontal lines on it, for which process he could easily propel his own wheel. On the wall hang two other jugs (with similar incised lines), and some plates (?) are stacked on the floor.

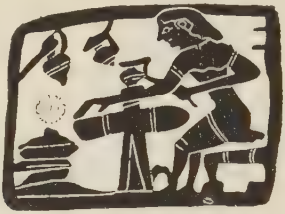


Fig. 62. Potter incising lines (?)
Gazette archéologique, 1880, p. 106 (3a)

6. *Corinthian pinax in the Berlin Museum.*

Antike Denkmäler, I, 1886, pl. 8, 14b.
Furtwängler, Beschreibung der Vasensammlung in Berlin, I, No. 885.

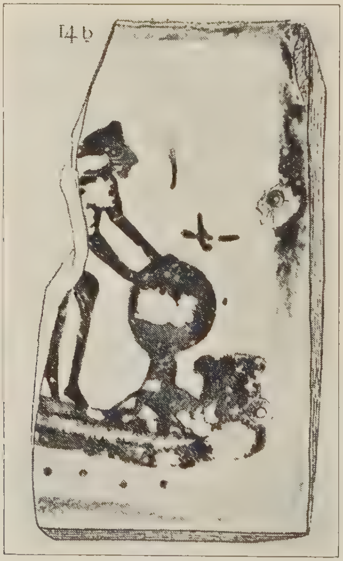


Fig. 63. Potter joining sections (?)
Antike Denkmäler, I, pl. 8, No. 14b

A man is sitting in front of a tall globular vase on a high foot. He is not throwing it, for there is no indication of a wheel. Perhaps he is joining the sections of a tall vase, some of which are already in place, while one part lies on the floor waiting to be attached. But the whole scene is so roughly painted that it is impossible even to know definitely that a potter is represented.

7. *Interior of a red-figured kylix, Berlin Museum No. 2542.*

Rayet et Collignon, Histoire de la céramique grecque, p. XVII, fig. 7.

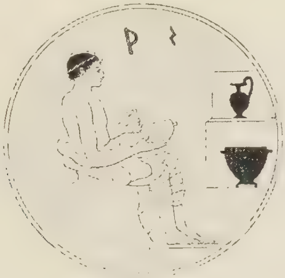


Fig. 64. Boy finishing vase

Rayet et Collignon, *Histoire de la Céramique grecque* p. XVII, fig. 7

A boy is sitting with a cup (kotyle) in one hand and an implement in the other, evidently engaged in a finishing process. Perhaps he is removing the surplus clay after the handles have been attached; for the vase is as yet unglazed and is left in the red color of the clay, in contrast to the black kotyle and oinochoë on the stand close by.

8. *Terracotta statuette of a potter in the British Museum.*

British Museum, Guide to Greek and Roman Life (2d edition), 1920, p. 181, fig. 216.

A man is represented in a crouching attitude apparently engaged in building a pot.

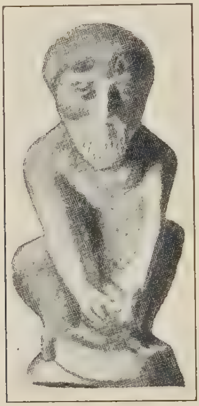


Fig. 65. Potter building a vase

British Museum, *Guide to Greek and Roman Life* (2d Edition), p. 181, fig. 216

DECORATING THE VASES

1. *Red-figured hydria in Ruvo.*

Annali dell'Instituto, 1876, pl. DE.

Athena and two Victories crowning potters at work. To the left is a potter sitting on a low stool and engaged in decorating a volute krater; he is holding a brush in his closed fist in Japanese fashion, and is looking in surprise at the Nike who is crowning him; by his side are two paint pots. In front of him another workman, comfortably seated on a chair, is busily painting a kantharos which he holds tipped on his lap. He also holds the brush in his fist downwards. Another kantharos and an oinochoë stand on the floor, awaiting their turn to be decorated; on a low stand close by are two paint pots, one with its lid tipped against the side. The artist is completely absorbed in his work and has not yet discovered Athena, the patron of arts and crafts, approaching him with a wreath. Behind Athena a third workman is seated on a low stool, decorating a bell krater with a palmette design. He tips up the vase with one hand, holds the brush firmly in his fist, and has his paint pot within easy reach on the floor. A Nike is about to crown him with a wreath; but he, too, is entirely engrossed in his work and quite unconscious of the honor to be conferred on him. Completing the scene on the right is a girl on a low platform painting the handle of a large volute krater. The figure is of special interest today, for it shows that there were women potters then as now. Above her on the wall are suspended a kantharos and a lekythos. The whole scene is of great importance as the most representative we possess of ancient vase painters at work.

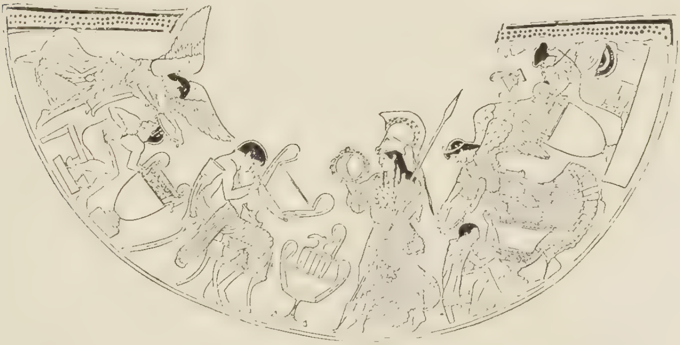


Fig. 66. Athena and Victories crowning potters at work
Annali dell'Instituto, 1876, pl. DE

2. *Red-figured kylix in the Museum of Fine Arts, Boston.*

Hartwig, Jahrbuch des Instituts, XIV, 1899, pl. 4.

A youth is sitting on a stool, holding a kylix by the foot and decorating the outside of it with what looks like a brush with long bristles, though it has also been identified as a feather (by Hartwig). In the hand that grasps the kylix is a pointed instrument which has been identified by Hartwig as the implement with which the preliminary sketch was drawn. The attitude of the painter suggests the quiet absorption required by a delicate task. Behind the youth is his knotted staff, and on the wall hang his oil flask and strigil.

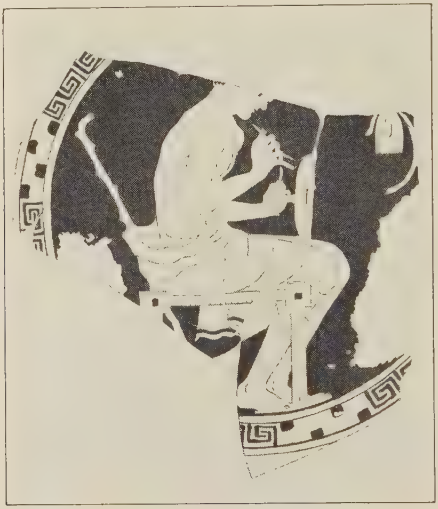


Fig. 67. Youth decorating kylix

Hartwig, *Jahrbuch des Instituts*, 1899, pl. IV

3. *Fragment of a red-figured kylix, found on the Akropolis, Athens.*

Hartwig, Jahrbuch des Instituts, XIV, 1899, p. 154, fig. 2.

A potter glazing the inside of a kylix as it rotates on the wheel. A woman appears to be crowning him with a wreath.

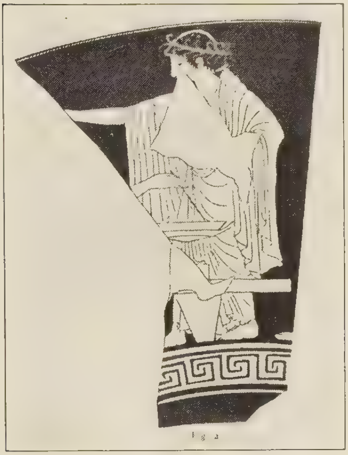


Fig. 68. Potter glazing kylix

Hartwig, *Jahrbuch des Instituts*, 1899, pl. 154, fig. 2

4. *Corinthian pinax in the Berlin Museum.*

Antike Denkmäler, I, pl. 8, No. 18.

Furtwängler, Beschreibung der Vasensammlung zu Berlin, I, No. 868.

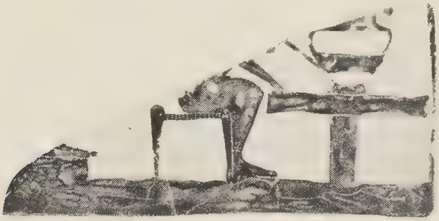


Fig. 69. Potter painting bands on a krater

Antike Denkmäler, I, pl. 8, No. 18

A potter is sitting on a stool before his wheel, apparently in the act of painting broad black bands on a column krater while the vase is revolving.

5. *Red-figured bell-krater in the Ashmolean Museum, Oxford.*

Beazley, Journal of Hellenic Studies, XXVIII, 1908, pl. XXXII, A.

To the left a youth is sitting on a stool painting the outside of a bell krater. He is steadying the vase with his left arm placed inside the krater, while he lets the rim rest on his lap. By his side is a low stand with a skyphos evidently containing the paint. A second workman is carrying off another krater to the right. He may be going to fetch some water or wine in it, for it is evidently a completed, fired vase, otherwise he would not be carrying it by the handles. A third workman is moving in the same direction holding up a skyphos, perhaps to get more paint or some water or wine to drink. A krater standing on the ground completes the scene. On the wall hang some implements of the potter's trade, identified by Beazley from the original as (1) a kylix for drinking, (2) a mortar for grinding the ingredients of the glaze, (3) a brush case, (4) a bowl to contain liquid glaze, (5) a strainer for sieving the glaze.

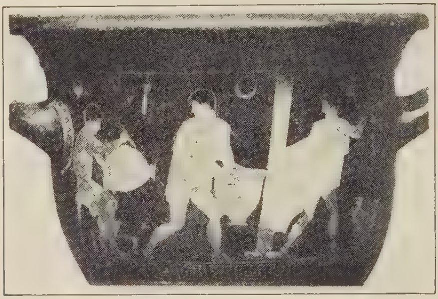


Fig. 70. Three youths, one painting a krater

Beazley, *Journal of Hellenic Studies,* XXVIII (1908), pl. XXXII, A

6. *Bœotian black-figured skyphos in the Polytechnion in Athens.*

Found in Lokris.
Blümner, Athenische Mittheilungen, XIV, 1889, p. 151.

The master of the pottery is sitting with a kylix in one hand, while with the other he is trying to beat a slave who is running off with three skyphoi. Three other skyphoi are on the ground, while a kantharos and a skyphos are near by on a shelf. Another workman is inspecting a skyphos he has just glazed; a paint pot and brush are on a low stand by his side. He takes no notice of a scene which is taking place close by, a man beating a slave suspended from the ceiling. The workmanship is very crude, and if it is a product of the pottery establishment which it depicts, it is a fair sample of the work we might expect from a place run on such methods!

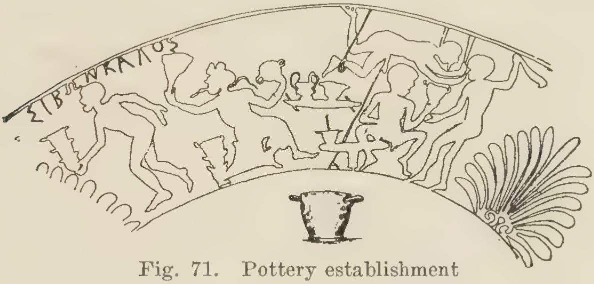
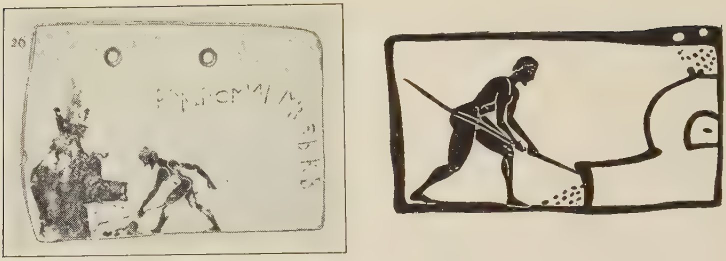


Fig. 71. Pottery establishment
Blümner, *Athenische Mittheilungen*, XIV, 1889, p. 151

FIRING THE VASES

1-10 *Votive tablets or pinakes found at Penteskuphia near Corinth, dating 650-550 B.C. (figs. 72-80). Nos. 73-78, 80 are in the Berlin Museum; Nos. 72, 79 in the Museum of the Louvre.*

Antike Denkmäler, I, 1886, pl. 8, Nos. 1, 4, 12, 15, 19b, 21, 22, 26 (Furtwängler, Beschreibung der Vasensammlung zu Berlin, I, Nos. 608, 802, 616, 893, 909, 827, 611). Gazette archéologique, VI, 1880, p. 105 (1), p. 106 (1).



Figs. 72-73. Potters stoking the fire
Antike Denkmäler, I, pl. 8, 26. *Gazette archéologique,* VI, p. 105.

Representations of potter's kilns.

The kilns are domed, and have three openings, one at the bottom for the fuel, one on the side for the insertion of the ware and to act as a spy-hole, and one at the top to let out the smoke and for the regulation of the draught. On figs. 72-79, the firemen are busy stoking the fire, and climbing to the top of the kiln to manipulate the draught-hole with a hooked implement; for the flames are seen emerging at the top, which means that heat is being wasted. Fig. 80 shows the inside of a kiln, in horizontal section, with two openings for the fire, each opening having two channels into the kiln. The vases should of course stand upright, but the painter naturally found it difficult to depict them in the right perspective looking at them from the top.

Furtwängler (Beschreibung der Vasensammlung zu Berlin, I, p. 70, note) was inclined to think that these ovens are not pottery kilns, but furnaces for metal smelting. His objections, however, do not hold. The ovens are not too large for pottery, and the climbing to the top for the regulation of the draught is a well-known proceeding. Moreover, the scene (fig. 80) showing the stacked vases, the little pots painted on figs. 75 and 78 as if to indicate the purpose of the ovens, and the representations of potters at

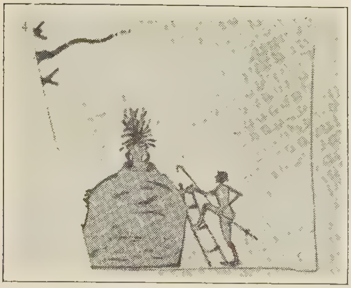


Fig. 74.

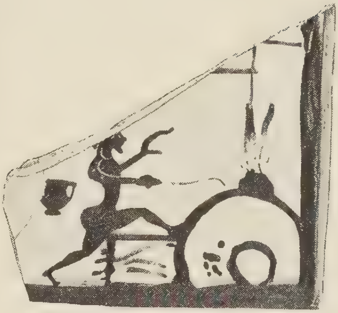


Fig. 75.

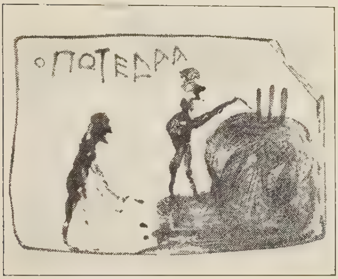


Fig. 76.

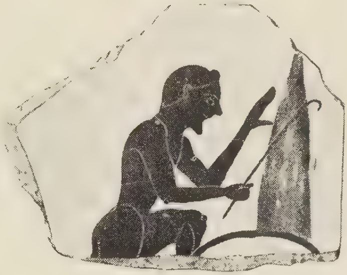


Fig. 77.

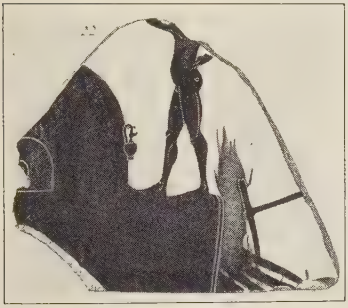


Fig. 78.

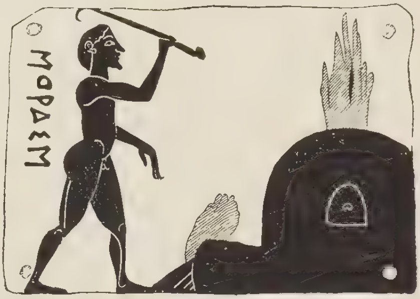


Fig. 79.

Figs. 74-79. Potters regulating draught

Antike Denkmäler, I, pl. 8, Nos. 4, 12, 1, 21, 22; *Gazette archéologique,* VI, p. 106.

work on other tablets, make the interpretation as pottery kilns the most likely. These pictures are of special importance since no actual Greek kilns have yet been discovered, though several Etruscan and numerous Roman ones have come to light (cf. Montelius, Civilisation primitive, pl. 107, 11, and Blümner, op. cit., II, pp. 23 ff.).

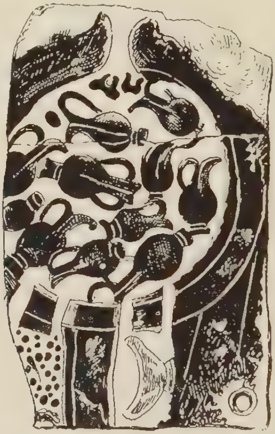


Fig. 80. Vases stacked in potter's kiln
Antike Denkmäler, I, pl. VIII, No. 19b

MISCELLANEOUS SCENES

1. *Engraved gem, present whereabouts not known.*

Millin, Peintures de vases antiques, II, title vignette.

A youth is sitting in front of an oven removing with two sticks a two-handled vase which has been placed there for drying. He is using the sticks instead of his fingers because the pot is too hot to touch; not in order to avoid injuring the fresh glaze on the vase, as has been suggested (cf. Blümner, Technologie u. Terminologie II, 1895, p. 52), for the sticks would mark the glaze as much as the fingers would. Modern potters often use sticks for removing hot ware from the kilns (cf. p. 36).

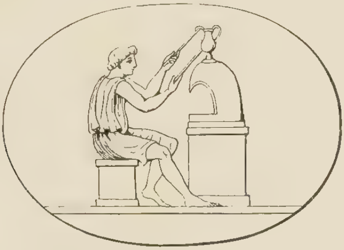


Fig. 81. Youth removing vase from oven with two sticks
Millin, *Peintures de vases,* II, title vignette

2. *Engraved gem, present whereabouts not known.*

Millin, Peintures de vases antiques, I, vignette.
Blümner, Technologie u. Terminologie, II, p. 52, fig. 13.

A youth is sitting on a low tripod in front of an oven. He holds a jug by the handle, and seems to be working on it with an instrument. It is not clear what he is doing; the way he holds the vase by one handle suggests that the vase has been fired. On the oven are a kylix and an oinochoë, perhaps placed there for drying.

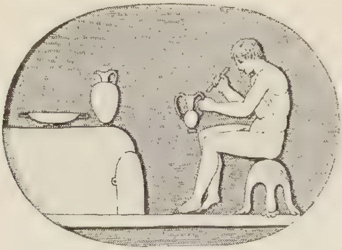


Fig. 82. Youth working on vases (?)
Millin, *Peintures de vases,* I, vignette

3. *Archaic Greek stele in the Akropolis Museum, Athens.*

Lechat, *La Sculpture attique avant Pheidias,* p. 367, fig. 29.
Dickins, Catalogue of the Akropolis Museum at Athens, p. 272, No. 1332.

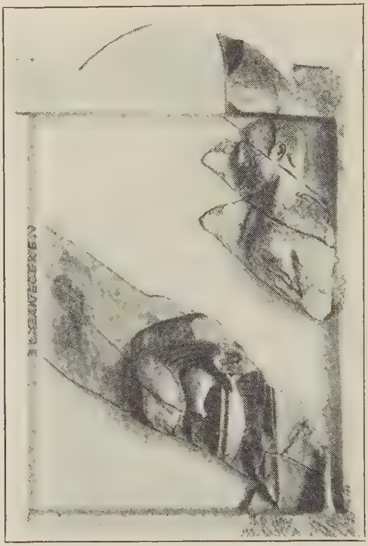


Fig. 83. Master potter (?)
Lechat, *La Sculpture attique avant Pheidias,* p. 367, fig. 29

A bearded man is represented seated, holding in his left hand two kylikes, one by the handle, the other by the foot. A large part of the stele is missing. The figure has been interpreted, with some probability, as a "master potter."

4. *Greek stele in the Metropolitan Museum of Art, New York.*

Richter, Handbook of the Classical Collection, p. 209, fig. 125.

A woman is represented seated with a pyxis on her lap and a lekythos in one hand. On the analogy of the Akropolis stele, it is possible that here too we have a votive offering of a potter.

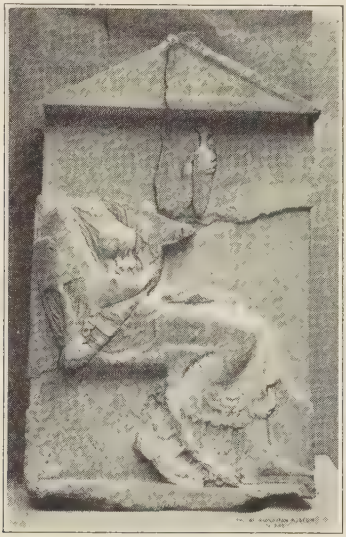


Fig. 84. Woman potter (?)

Met. Mus. Acc. No. 08.258.42

5. *Interior of a kylix in the Johns Hopkins University, Baltimore.*

Hartwig, Die griechischen Meisterschalen, pl. XVII, I, and title vignette.

Hoppin, A Handbook of Attic Red-Figured Vases, II, p. 355.

A client in a potter's shop is examining the stacked ware, and holds his purse ready to pay for what he will select.

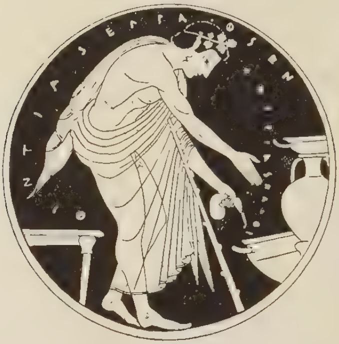


Fig. 85. Client in potter's shop

Hartwig, *Die griechischen Meisterschalen,* title vignette

6. *Fragment of a Corinthian pinax in the Berlin Museum.*

Antike Denkmäler, I, 1886, pl. 8, 3a.

Furtwängler, Beschreibung der Vasensammlung zu Berlin, I, No. 831b.

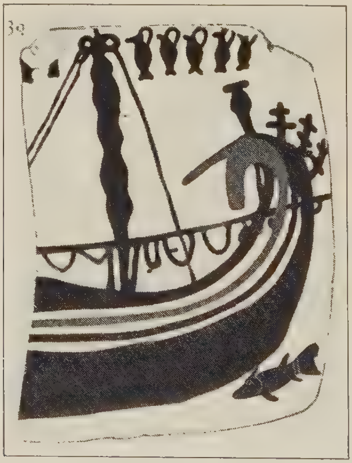


Fig. 86. Ship with cargo of pottery
Antike Denkmäler, I, pl. 8, 3a

Sailing-ship with a sheet wound round the mast, and a row of jugs painted in the field above. The latter apparently indicate the cargo of the ship, and the tablet is probably an offering of a merchant to the sea-god Poseidon for the safe conduct of his precious consignment to foreign lands.

This is the only picture we have of the transport of Greek vases, which we know played so significant a part in Greek ceramic industry. Even in the seventh century B.C., when most important localities produced their own wares, such shipments must have been frequent, since, for instance, large numbers of Corinthian vases have been unearthed in Etruria, and Laconian vases are found scattered far and wide. In the sixth and fifth centuries B.C., when Athens supplied a large part of the Greek world with her pottery, the trade must have been an exceedingly active one; so that we must imagine ship after ship laden with pottery sailing from the Piraeus for distant lands.

REPRESENTATIONS WRONGLY INTERPRETED AS POTTERY SCENES

From time to time various representations have been interpreted as pottery scenes which probably have no such significance. The following are the two most important.

1. *Interior of a kylix in the Metropolitan Museum of Art.*

A satyr is stoking the fire of an oven on which is a skyphos. This scene is figured in many of the books on vases (cf. e.g. Walters, History of Ancient Pottery, I, p. 216, fig. 68) and interpreted as a satyr firing pottery; probably he is simply cooking his dinner.

2. *Interior of a kylix.*

Gerhard, Auserlesene Vasenbilder, pls. CLXXX-CLXXXI.

Youth holding the rim of a large krater with both hands. He is sometimes interpreted as a potter working on a vase; but there is no clear connection with pottery work.

POTTER'S IMPLEMENTS

Unfortunately very few potter's implements of classical Greek times have survived. We have no Athenian wheel or kiln or turning tools. And even from other periods the list of such utensils is a slim one. But what has survived here and there from other periods is in line with the general trend of the evidence—that the techniques in ancient times were very similar to what they are today. Perhaps the most interesting pieces are the terracotta disks found at Gournia, Arezzo, and elsewhere,[1] which are wheel-heads[2] on

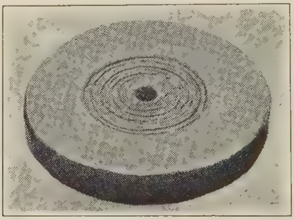


Fig. 87. Wheel-head

British Museum, *Guide to Greek and Roman Life* (2d Edition), p. 181, fig. 217

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[1] Cf. e.g. Zahn, Berichte der sächsischen Gesellschaft, 1854, p. 40, note 46; British Museum, Guide to Greek and Roman Life (2d edition), 1920, p. 181, fig. 217 (No. 1905.6-13.1); Déchelette, Les vases céramiques ornés de la Gaule romaine, II, 1904, p. 338.

[2] Nowadays plaster or wood is the usual material for such wheel-heads.

which the pottery was thrown and turned. On the under side of some of these is a hole for insertion in the pivot (fig. 87).

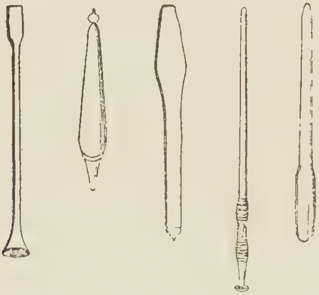

Fig. 88. Tools found at Arezzo

Daremberg et Saglio, *Dictionnaire des antiquités grecques et romaines,* p. 1122, fig. 3036

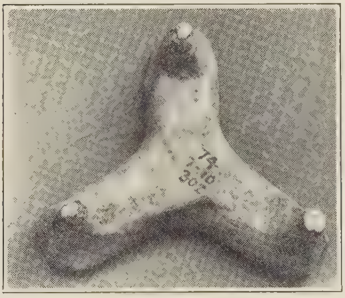

Fig. 89. Stilt

The potter's tools found at Arezzo (fig. 88)[1] are not unlike our modern modeling tools and were doubtless used for various finishing processes.

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[1] Cf. e.g. Fabroni, Storia degli antichi vasi fittili aretini, 1841, pl. III, 9, 10; V, 7, 8, 9; p. 64, and Daremberg et Saglio, Dictionnaire, under figlinum, p. 1122, fig. 3036.

In the British Museum (Nos. 74.7-10,302) are terracotta stilts used for supporting vases in the kilns, very like the stilts used by potters today. It is unlikely that they were used by the Athenian potters, since the Greek black glaze is so thin it would not be apt to run, but for the Roman ware with metallic glaze they were essential, and the marks they left are visible on the feet of the vases.[1] On one of the British Museum stilts (fig. 89) are remains of a greenish glaze from such a vase. No moulds for the Athenian plastic ware have to my knowledge been found. But moulds for the later wares, such as the Arretine, are of course plentiful. They are invariably made of burnt clay. The kilns which have survived all date from Roman times (cf. Blümner, op. cit., II, pp. 23 ff.).

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[1] Cf. e.g. Nos. 15.163.1, 17.120.250 in the Metropolitan Museum.

III. REFERENCES TO THE POTTERY CRAFT IN ANCIENT LITERATURE

THE information derived from ancient literature on the subject of the technique of Athenian vases is decidedly meagre; and naturally so. The only people who could have given us valuable data regarding technical questions were the potters themselves, and they were not writers. Outsiders knew as little of the technique of the craft as they do today. So we obtain from them only general remarks; and these on the whole bear out the points we have already made. Occasionally, however, they throw fresh light on a question, or give us information on some point on which the vases themselves cannot speak, such as the status of the ancient potters, the value placed on the vases, etc. It is important, therefore, to examine the chief references in Greek and Roman literature on this subject.

PREPARATION OF THE CLAY

Geoponica, II, 49.

3. It is most necessary for every reason to have potters (on a farm), since we are convinced that it is possible to find potter's clay on any land; for either on the surface, or deep down, or in out-of-the-way places on the land you will find earth suitable for making pottery.

3. ’Αναγκαιότατον δὲ καὶ κεραμέας ἔχειν πάντων ἕνεκα, πεπεισμένον ὅτι ἐν πάσῃ τῇ γῇ ἔστιν εὑρεῖν κεραμικὴν γῆν, ἢ γὰρ ἐπιπολάσιον, ἢ ἐν βάθει, ἢ ἐν ἀποκεκρυμμένοις μέρεσι καὶ τόποις τοῦ χωρίου ἐπιτηδείαν γῆν πρὸς κατασκευὴν κεράμων εὑρήσεις.

The abundance of clay on Greek soil must have helped the manufacture of the many local varieties before Athens obtained the monopoly in the sixth century B.C.

Geoponica, VI, 3.

On making pithoi	περὶ κατασκευῆς πίθων
1. Not all earth is suitable for pottery, but with regard to potter's clay, some prefer the yellowish red, some the white, and others mix the two. 2. Some in judging of a well-made pithos are satisfied if, when struck, it gives forth a sharp, clear sound. 3. That, however, is not enough, but the person in charge ought to be present while the work is going on, and see to it that the clay has been well worked, and not let it be put on the wheel before the clay shows what sort of pot it will make when fired.	1. Γῆ οὐ πᾶσα ἐπιτήδειος πρὸς κεραμείαν, ἀλλὰ τῆς κεραμίτιδος γῆς οἱ μὲν προκρίνουσι τὴν πυρρὰν τὸ χρῶμα, οἱ δὲ τὴν λευκήν, οἱ δὲ ἀμφοτέρας συμμιγνύουσι. 2. Τινὲς μὲν οὖν ἀρκοῦνται ἐν τῇ δοκιμασίᾳ τοῦ καλῶς κεκεραμευμένου πίθου, τῷ κρουσθέντα αὐτὸν ἀποδοῦναι ἦχόν τινα ὀξὺν καὶ πορόν. 3. οὐκ ἔστι δὲ τοῦτο αὔταρκες, ἀλλὰ χρὴ τὸν κατασκευάζοντα παρεῖναι τῇ κεραμείᾳ, καὶ ὅπως ὁ πηλὸς καλῶς εἰργασμένος εἴη προνοῆσαι, καὶ μὴ πρὶν ἐᾶσαι ἐπὶ τὸν τροχὸν ἀναβιβάσαι, πρὶν τὸν πηλὸν διαδεῖξαι ὁποῖος ἔσται ὁ πίθος ὀπτηθείς.

Good potters were evidently well aware, then as now, of the importance of the right composition and consistency of their clay. It is also interesting to note that potters in modern Athens still regularly use a mixture of red and white clay (cf. p. 40, note 2).

Sophokles, Fragments, 438.

First begin to work the clay with your hands.	Καὶ πρῶτον ἄρχου πηλὸν ὀργάξειν χερσῖν.

Hesychius, Lexicon, s. v. ὀργάσαι

ὀργάσαι: to make ready; or as is said, to knead the clay, which is to prepare it, to mix it, to wet it, to work it into a plastic mass.	ὀργάσαι· ἑτοιμάσαι, καὶ τὸν πηλὸν ὀργάσαι φασίν, ὅ ἐστιν ἑτοίμασαι, φυρᾶσαι, βρέξαι, ἀνάδευσαι.

'Οργάσαι in other words was the Greek expression for wedging the clay and getting it ready for throwing.

FASHIONING THE VASES

(1) WHEELWORK

Diodorus Siculus, IV, 76.

Talos, the son of Daedalus' sister, was brought up as a child by Daedalus, and being cleverer than his teacher, he invented the potter's wheel.

Τῆς ἀδελφῆς τῆς Δαιδάλου γενόμενος υἱὸς Τάλως ἐπαιδεύετο παρὰ Δαιδάλῳ παῖς ὢν τὴν ἡλικίαν, εὐφυέστερος δ' ὢν τοῦ διδασκάλου τὸν κεραμευτικὸν τροχὸν εὗρε.

Strabo, Geography, VII, p. 303.

Ephoros says that Anacharsis' inventions were the bellows, the double-fluked anchor, and the potter's wheel. I repeat this statement, although I am well aware that this writer is not very accurate, and especially in the account of Anacharsis, for how could the potter's wheel be an invention of his, while Homer[1] who was of an earlier time knew of it?

Ὁ Ἔφορος................ εὑρήματά τε αὐτοῦ λέγει τά τε ζώπυρα καὶ τὴν ἀμφίβολον ἄγκυραν καὶ τὸν κεραμικὸν τροχόν. ταῦτα δὲ λέγω σαφῶς μὲν εἰδὼς ὅτι καὶ οὗτος αὐτὸς οὐ τἀληθέστατα λέγει περὶ πάντων, καὶ δὴ καὶ τὸ τοῦ Ἀναχάρσιδος. πῶς γὰρ ὁ τροχὸς εὕρημα αὐτοῦ, ὃν οἶδεν Ὅμηρος πρεσβύτερος ὤν;

Pliny, Natural History, VII, 198.

Coroebus the Athenian invented earthen pots, and among the inventors, the Scythian Anacharsis, or as others say, Hyperbius the Corinthian, discovered the potter's wheel.

....figlinas (invenit) Coroebus Atheniensis, in iis orbem Anacharsis Scythes, ut alii, Hyperbius Corinthus.

Critias, Elegies, I, 12-14 (Bergk).

The child of the wheel and the earth and the kiln, the famous pottery, useful house servant, that city invented which set up the glorious trophy at Marathon.

Τὸν δὲ τροχοῦ γαίης τε καμίνου τ' ἔκγονον εὗρεν,
κλεινότατον κέραμον, χρήσιμον οἰκονόμον,
ἡ τὸ καλὸν Μαραθῶνι καταστήσασα τρόπαιον.

It is natural that the ancients should have attributed the great invention of the potter's wheel to various individuals or cities, but they themselves realized the anomaly of ascribing it to a comparatively recent period, when it was known to Homer (see below). Actual remains of wheel-thrown vases show that the wheel was known in Crete and Greece in the Early Minoan and Early Helladic III periods (before 2200 B.C.) and in Egypt in the third and fourth dynasties[1] (about 3000 B.C.).

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[1] Cf. e.g. Iliad, XVIII, 599-601, quoted below.

Homer, Iliad, xviii, 599-601.

And now they would run round with deft feet exceeding lightly, as when a potter sitting by his wheel that fitteth between his hands maketh trial of it whether it run. (Lang, Leaf and Myers.)

Οἱ δ’ ὁτὲ μὲν θρέξασκον ἐπισταμένουσι πόδεσσιν,
ῥεῖα μαλ’, ὡς ὅτε τις τροχὸν ἄρμενον ἐν παλάμῃσιν.
ἑζόμενος κεραμεὺς πειρήσεται, αἴ κε θέῃσιν.

Plutarch, De genio Socratis, p. 588f.

One ought not to be surprised at seeing the movement of large merchant-vessels controlled by small helms, nor the whirling of the potter's wheel moving regularly at the mere touch of the tips of his fingers.

Οὐ δεῖ δὲ θαυμάζειν ὁρῶντας τοῦτο μὲν ὑπὸ μικροῖς οἴαξι μεγάλων περιαγωγὰς ὁλκάδων, τοῦτο δὲ τροχῶν κεραμεικῶν δίνησιν ἄκρας παραψαύσει χειρὸς ὁμαλῶς περιφερομένων.

Persius, Satires, iii, 23-24.

[Advice to an idle young man of good position.]

You are wet, soft clay; at this very moment you should be hastening to shape yourself on the swift wheel.

udum et molle lutum es, nunc nunc properandus et acri
fingendus sine fine rota.

Hippokrates, Περὶ Διαίτης, I, *Littré,* vi, p. 494, §22.

Potters turn the wheel which moves neither backward nor forward and at the same time imitates the rotation of the universe, and on this same wheel as it whirls they make things of all kinds, no one of them like another, from the same materials with the same tools.

Κεραμέες τροχὸν δινέουσι, καὶ οὔτε ὀπίσω οὔτε πρώσω προχωρέει καὶ ἀμφοτέρωσε ἅμα τοῦ ὅλου μιμητὴς τῆς περιφορῆς· ἐν δὲ τῷ αὐτῷ ἐργάζονται περιφερομένῳ παντοδαπά, οὐδὲν ὅμοιον τὸ ἕτερον τῷ ἑτέρῳ ἐκ τῶν αὐτῶν τοῖσιν αὐτοῖσιν ὀργάνουσιν.

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[1] Cf. Reisner, Naga-ed-Dêr, I, p. 133.

The fascination of a pot shaped on a rapidly turning wheel appealed to the ancients as it does to us; and the parallelism between a pot in the making and man shaped by life is too obvious to have escaped them. Hippokrates' remark that of the vases produced on the wheel no two are alike is characteristic of the Greek love of variety.

Ecclesiasticus, 38, 32.

So does the potter sitting at his work and turning his wheel round with his feet, who is always painstaking with his task, and all his work is done by number. He moulds the clay with his arm, and his feet. [Literal translation of the Greek text written by a Hebrew and evidently colored by his own idiom.]

Οὕτω κεραμεὺς καθήμενος ἐν ἔργῳ αὐτοῦ, καὶ συστρέφων ἐν ποσὶν αὐτοῦ τροχόν, ὃς ἐν μερίμνῃ κεῖται διὰ παντὸς ἐπὶ τὸ ἔργον αὐτοῦ, καὶ ἐναρίθμιος πᾶσα ἡ ἐργασία αὐτοῦ.

’Εν βραχίονι αὐτοῦ τυπώσει πηλόν. καὶ πρὸ ποδῶν κάμψει ἰσχὺν αὐτοῦ.

This is the only place in ancient literature in which the action of the foot in wheelwork is referred to. In the second century B.C., therefore, we might assume the knowledge of the kick-wheel, though it may well have been in use long before then, since it is a simple and obvious device. Where labor, however, was cheap and plentiful, as in fifth-century Athens, a slave boy turning the wheel for the potter, whose whole strength and attention could then be expended on his work, would be preferable; and this is the manner in which wheelwork is depicted in Athenian vase paintings (cf. pp. 64 ff.).

Athenaeus, XI, p. 480 c.

These kylikes are clay drinking-cups, and are so called from being turned on the wheel.

Ταῦτα δ’ ἐστὶ κεράμεα ποτήρια καὶ λέγεται ἀπὸ τοῦ κυλίεσθαι τῷ τροχῷ.

The kylix is, of course, the wheel-made vase par excellence. Nothing so light and graceful or with such a fine flow of line could be produced by handwork.

Plato, Gorgias, p. 514 e.

Is not this, as they say, to learn the potter's craft by undertaking a pithos,....and does not this seem to you a foolish thing to do?

Τὸ λεγόμενον δὴ τοῦτο ἐν τῷ πίθῳ τὴν κεραμείαν ἐπιχειρεῖν μανθάνειν.... ....οὐκ ἀνοητόν σοι δοκεῖ ἂν εἶναι οὕτω πράττειν;

Plato, Laches, p. 187 b.

For if this is your first attempt at education, you must take care lest you try the experiment, not on a Carian slave, but on your sons or the children of your friends, and let the proverb fit you which says that the potter's art is in the pithos.

Εἰ γὰρ νῦν πρῶτον ἄρξεσθε παιδεύειν, σκοπεῖν χρὴ μὴ οὐκ ἐν τῷ Καρὶ ὑμῖν ὁ κίνδυνος κινδυνεύηται, ἀλλ' ἐν τοῖς ὑέσι τε καὶ ἐν τοῖς τῶν φίλων παισί, καὶ ἀτεχνῶς τὸ λεγόμενον κατὰ τὴν παροιμίαν ὑμῖν συμβαίνῃ ἐν πίθῳ ἡ κεραμεία γιγνομένη.

Scholiast on Plato, Laches, p. 187 b.

The proverb, "in the pithos is the potter's art," about those who skip the first lessons and take hold of the greatest tasks which are properly the last.

Παροιμία, ἐν πίθῳ τὴν κεραμείαν, ἐπὶ τῶν τὰς πρώτας μαθήσεις ὑπερβαινόντων, ἁπτομένων δὲ τῶν μειζόνων καὶ ἤδη τῶν τελειοτέρων.

Corpus Paroemiographorum Graecorum. Zenobius, III, 65.

"I learn the potter's craft on the pithos"; a proverb upon those who skip the first lessons, and immediately attempt greater things; as if anyone who was learning to be a potter, before learning to mould plates or any other small thing, should undertake a pithos.

'Εν πίθῳ τὴν κεραμείαν μανθάνω: Παροιμία ἐπὶ τῶν τὰς πρώτας μαθήσεις ὑπερβαινόντων, ἁπτομένων δὲ εὐθέως τῶν μειζόνων. Ὡς εἴ τις μανθάνων κεραμεύειν, πρὶν μαθεῖν πίνακας ἢ ἄλλο τι τῶν μικρῶν πλάττειν, πίθῳ ἐγχεροίη.

The fact that there was a Greek proverb on the folly of attempting large vases before a thorough knowledge of the craft has been acquired, shows how common was the realization of the difficulty of the task.

Plutarch, Quaestiones conviviales, II, p. 636 c.

Polykleitos the modeler said that the work is most difficult when the clay stands the test of the nail (?).

Πολύκλειτος ὁ πλάστης εἶπε χαλεπώτατον εἶναι τοὔργον, ὅταν ἐν ὄνυχι ὁ πηλὸς γένηται.

If we interpret this passage as referring to a potter, and *ὅταν ἐν ὄνυχι γένηται* as meaning when the stage has been reached that the clay is hard enough to be scratched with the nail, this may possibly be an allusion to turning; which may well be called the most difficult process of pottery making. But this interpretation is very uncertain. The passage is usually taken as referring to the sculptor's last touches on a clay model for a bronze statue.

(2) BUILDING

Geoponica, VI, 3 (4).

4. Potters do not use the wheel for all pithoi, but only for the small ones. The larger ones they build up day by day, placing them on the ground in a warm room, and thus make them large.

4. Οὐ πάντας δὲ τοὺς πίθους ἐπὶ τὸν τροχὸν ἀναβιβάζουσιν οἱ κεραμεῖς, ἀλλὰ τοὺς μικρούς. τοὺς μέντοι μείζους χαμαὶ κειμένους ὁσημέραι ἐν θερμῷ οἰκήματι ἐποικοδομοῦσι, καὶ μεγάλους ποιοῦσιν.

Pollux, Onomasticon, VII, 164.

164. That around which those who make pithoi put the clay and shape it—this wooden core is called *κάναβος*.

164. Περὶ δὲ ὃ οἱ τοὺς πίθους πλάττοντες τὸν πηλὸν περιτιθέντες πλάττουσι, τοῦτο τὸ ξυλήφιον κάναβος καλεῖται.

Such hand-built ware does not, of course, include the large painted kraters and amphorai of Athenian make; for these have all the ear-marks of wheel-thrown pottery. Wooden cores are still used today in the making of cement forms. Since the clay cement shrinks upon drying and the wood does not, care must be taken to prevent the former from cracking. The wooden core is therefore made in collapsible form. A wedge is made in the center and a core built around it. When the work is finished the wedge can be drawn out and the sides of the core will fall in.[1]

FIRING THE VASES

Geoponica, VI, 3 (5).

5. The firing is no small part of the potter's craft. Not too little or too much fire should be built under the pots, but just enough.

Οὐ μιϰρὸν δὲ τῆς ϰεραμίας ἐστὶ μέρος ἡ ὄπτησις· δεῖ δὲ μήτε ἔλαττον, μήτε πλέον, ἀλλὰ μεμετρημένως τὸ πῦρ ὑποϐάλλειν.

Vita Herodotea λβ = *Epigrammata Homerica*, 14.

(Text of T. W. Allen, in Oxford University Classical Texts.)

Some potters, seeing him [Homer] setting out the next morning while they were building a fire in a kiln of fine pottery, called him to them, knowing that he was a poet, and they bade him sing, promising to give him some of the pottery and whatever else they had, and Homer sang to them the following poem, which is called the "Kiln":—

"If you will give me a reward I will sing to you, O potters. Come hither, Athena, and stretch thy hand over the kiln, and may the kotyloi blacken well and all

Τῇ δὲ εἰσαύριον ἀποπορευόμενον ἰδόντες ϰεραμέες τινες ϰάμινον ἐγϰαίοντες ϰεράμου λεπτοῦ, προσεϰαλέσαντο αὐτόν, πεπυσμένοι ὅτι σοφὸς εἴη· ϰαὶ ἐϰέλευόν σφιν ἀεῖσαι, φάμενοι δώσειν αὐτῷ τοῦ ϰεράμου ϰαὶ ὅ τι ἂν ἄλλο ἔχωσιν. ὁ δὲ Ὅμηρος ἀείδει αὐτοῖς τὰ ἔπεα τάδε ἃ ϰαλέεται Κάμινος·

Εἰ μὲν δώσετε μισθὸν ἀείσω, ὦ ϰεραμῆες·
δεῦρ' ἄγ' 'Αθηναίη ϰαὶ ὑπείρεχε χεῖρα ϰαμίνου,
εὖ δὲ μελανθεῖεν ϰότυλοι ϰαὶ πάντα μάλευρα,

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[1] This information I owe to Mr. Binns.

the . . . . . . and may they be well baked, and receive the price due to their value, many being sold in the market, and many in the streets. May they gain much. . . . But if you turn to shamelessness, and choose falsehood, then I summon the destroyers to fall upon the kiln, Crasher and Smasher and Unquenchable and Shatterer and Fierce Conqueror, who would bring many evils upon this craft . . . . . . and may the whole kiln be thrown into confusion, while the potters lament loudly. As a horse's jaw eats greedily, so may the kiln devour all the pottery within it, making it brittle. Come hither, Circe, daughter of the sun, skilled in drugs; bring malignant poisons, afflict the men and ruin their work. Let Cheiron bring hither many Centaurs, both those who escaped the hands of Herakles, and those who perished. Let them harshly smite the work and smite the kiln, and may the men themselves see these grievous deeds with lamentations. But I shall be happy when I see their unlucky craft. And the man who peeps over, may his whole face burn on account of this, so that all may know how to do what is right."

φρυχθῆναί τε καλῶς καὶ τιμῆς ὤνον ἀρέσθαι,
πολλὰ μὲν εἰν ἀγορῇ πωλεύμενα, πολλὰ δ' ἀγυιᾶς,
πολλὰ δὲ κερδῆναι, ἡμῖν δὲ δὴ ὥς σφι νοῆσαι.
ἢν δ' ἐπ' ἀναιδείην τρεφθέντες ψεύδε' ἄρησθε
συγκαλέω δ' ἤπειτα καμίνῳ δηλητῆρας,
Σύντριβ' ὁμῶς Σμάραγόν τε καὶ Ἄσβετον ἠδέ γ' Ἄβακτον,
Ὠμόδαμόν θ' ὃς τῇδε τέχνῃ κακὰ πολλὰ πορίζοι.
πεῖθε πυραίθουσαν καὶ δώματα, σὺν δὲ κάμινος
πᾶσα κυκηθείη κεραμέων μέγα κωκυσάντων.
ὡς γνάθος ἱππείη βρύκει, βρύκοι δὲ κάμινος
πάντ' ἐντοσθ' αὐτῆς κεραμήϊα λεπτὰ ποιοῦσα.
δεῦρο καὶ ἠελίου θύγατερ πολυφάρμακε Κίρκη.
ἄγρια φάρμακα βάλλε, κάκου δ' αὐτούς τε καὶ ἔργα.
δεῦρο δὲ καὶ Χείρων ἀγέτω πολέας Κενταύρους,
οἵ θ' Ἡρακλείους χεῖρας φύγον, οἵ τ' ἀπόλοντο·
τύπτοιεν τάδε ἔργα κακῶς, τύπτοι δὲ κάμινον,
αὐτοὶ δ' οἰμῴζοντες ὁρῴατο ἔργα πονηρά.
γηθήσω δ' ὁρόων αὐτῶν κακοδαίμονα τέχνην.
ὃς δὲ χ' ὑπερκύψῃ, περὶ τούτου πᾶν τὸ πρόσωπον
φλεχθείη, ὡς πάντες ἐπίσταιντ' αἴσιμα ῥέζειν.

This is a good picture of the havoc that may happen in a kiln.

Hippokrates, Epidemia, IV, 20; *Littré,* V, p. 160.

The man who fell down from the potter's oven, since a cupping-glass was not applied immediately, suffered from an internal inflammation and on the twentieth day grew worse.

῾Ο ἀπὸ τοῦ κεραμέου ἴπνου καταπεσὼν, ᾧ οὐ προσβλήθη αὐτίκα σικύη, ἐκαύθη ἔσω, καὶ εἰκοστῇ ἐπαλιγκότησεν.

This reminds us of the men we see climbing on the kilns in the representations on Corinthian pinakes (p. 76).

Pollux, Onomasticon, VII, 108.

It was the custom for bronze casters to hang something ridiculous in front of their furnaces, or to mould something upon them, in order to avert envy. These were called *βασκάνια*.

Πρὸ δὲ τῶν καμίνων τοῖς χαλκεῦσιν ἔθος ἦν γελοῖά τινα καταρτᾶν, ἢ ἐπιπλάττειν, ἐπὶ φθόνου ἀποτροπῇ. ἐκαλεῖτο δὲ βασκάνια.

Such devices to avert the evil eye would apply equally to pottery kilns, as we know from actual representations (cf. pp. 64 f.). It is natural that the vagaries of a kiln should be ascribed by the superstitious ancients to supernatural forces.

RED OCHRE WASH

Inscriptiones Graecae, II, 1, 546.

Be it decreed by the senate and people of the Ioulietai concerning the representations of the envoys from Athens, that the export of miltos shall be to Athens, and to no other place from this day forward; if anyone exports it to any other place, his ship and its cargo shall be confiscated and a half shall be given to the informer; ...... If the Athenians decree any other regulations for the guarding of the miltos they shall be valid.

(Ἔδ)οξεν τῇ βουλῇ καὶ τῷ δήμῳ τῷ Ἰουλιητῶν, περὶ (ὧν οἱ παρ' Ἀθηναίων λέγουσι, δεδόχθα)ι τῇ βούλῃ καὶ τῷ δήμῳ τῷ Ἰουλιητῶν, εἶναι τὴ(ν ἐξαγωγὴν τῆς μίλτου Ἀθήναζε), ἄλλοσε δὲ μηδαμῆ ἀπὸ τῆσδε τῆς ἡμέρας. ἐὰν δὲ τι(ς ἄλλοσε ἐξάγῃ, δημόσια εἶναι τ)ὸ πλοῖον καὶ τὰ χρήματα τὰ ἐν τῷ πλοίῳ. τῷ δὲ φήν(αντι ἢ ἐνδείξαντι εἶναι τὰ ἡμίσεα)...............

....

(ἐὰν δέ τι ἄλ)λο ψηφίζωνται Ἀθηναῖοι περὶ φυλακῆς τῆς μίλ(του.... κύρια εἶ)ναι ἃ ἂν Ἀθηναῖοι ψηφίζωνται.

Inscriptiones Graecae, II, 1, 546.

Theogenes moved: be it decreed by the senate and people of the Koresians, concerning the representations of the envoys from Athens, the export of miltos shall be to Athens. . . . . as it was before; and in order that the decrees of the Athenians and Koresians concerning miltos may be valid, it shall be exported in a ship which they shall designate and in no other ship. . . . . .the tax of two per cent shall be paid to the collectors by those engaged in the trade.

(Θεογ)ένης εἶπεν. δεδόχθαι (τ)ῃ βο(υλῇ ϰαὶ τῷ δήμῳ τῷ Κορησίων. περὶ ὧν λέγουσι οἱ παρ' Ἀθη)ναίων, εἶναι τῆς μίλτου τὴν ἐξ(αγωγὴν Ἀθήναζε..... .... ϰ)αθάπερ πρότερον ἦν. ὅπως δ' ἂν ϰύρια ᾖ(ι τ)ὰ ψηφίσματα (............Ἀθηναίων ϰ)αὶ Κορησίων τὰ περὶ τῆς μίλτου, ἐξάγειν ἐμπλοίῳ ὧ(ι ἂν................ἀποδείξωσιν, ἐν ἄλλῳ) δὲ πλοίῳ μηδενί . . ..

....

(τελ)εῖν δὲ τὴν πεντηϰοστὴν τοῖς πεντηϰοστολόγοις τοὺς ἐργαζομένους.

It is interesting to learn how important miltos (red ochre) was to the Athenians. We know that it was used in building for the dressing of stones[1]; and if the appearance of one of the chief articles of commerce of Athens, viz. the pottery, was dependent on it (cf. pp. 53 ff.), it is natural that stringent provisions should be made for its acquisition and monopoly.

Pliny, Natural History, XXXV, 12 (43), 152.

The addition of red ochre or moulding in red clay is the invention of Butades.

Butades inventum est rubricam addere aut ex rubra creta fingere.

Suidas, Lexicon, s. v. Κωλιάδος κεραμῆες.

Potters of Kolias: Kolias, a place in Attica where vases are moulded. It is said that of all the kinds of clay that are brought to the wheel (and the wheel on which vessels are shaped is meant), that is, of all the clay fit for making vases, the clay of Kolias is the best, so that it is also dyed with miltos.

Κωλιάς, τόπος τῆς Ἀττιϰῆς, ἔνθα σϰεύη πλάττονται, λέγει οὖν ὅτι ὅσοι ἐπὶ τροχοὺς φέρονται (τροχὸν δὲ τὸν σϰευοπλαστιϰὸν λέγει) τουτέστιν, ὅσαι πρὸς σϰευοπλασίαν ἐπιτήδειαι, πασῶν ἡ Κωλιάδος ϰρείσσων· ὥστε ϰαὶ βάπτεσθαι ὑπὸ τῆς μίλτου.

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[1] Cf. G. P. Stevens in Fowler-Wheeler, Greek Archaeology, p. 102.

Isidorus, Etymologiae, xx, iv, 3.

It is said that pottery vases were first invented in the island of Samos, being made of clay and hardened by fire, whence comes the term Samian vases. A later invention was to add red ochre and to make pottery of red clay.

Fictilia vasa in Samo insula prius inventa traduntur, facta ex creta et indurata igni; unde et Samia vasa: postea inventum et rubricam addere et ex rubra creta fingere.

The significance of these passages has already been discussed on pp. 53-59.

POROSITY OF GREEK POTTERY

Pollux, Onomasticon, VII, 161 ff.

162. Aristophanes says that a clay vinegar jar has leprosy, instead of saying that it is moist (sweats?).

162. Λεπρᾶν δὲ κεράμειον ὀξηρόν, ἀντὶ τοῦ μυδᾶν, Ἀριστοφάνης λέγει.

This appears to refer to the fact that unglazed ware (and even painted Athenian pottery is unglazed in parts) becomes moist when filled with liquid, on account of its porosity.

THE STATUS OF POTTERS

Isokrates, De Permutatione, 2.

As if one should have the insolence to call Pheidias, who made the statue of Athena, a statuette maker, or to say that Zeuxis and Parrhasius had plied the same trade as that of the painters of pinakes.

Ὥσπερ ἂν εἴ τις Φειδίαν τὸν τὸ τῆς Ἀθηνᾶς ἕδος ἐργασάμενον τολμῴη καλεῖν κοροπλάθον, ἢ Ζεῦξιν καὶ Παρράσιον τὴν αὐτὴν ἔχειν φαίη τέχνην τοῖς τὰ πινάκια γράφουσιν.

Aristophanes, Ekklesiazousai, 995 f.

Old Woman. Who is this?
Young Man. The man who paints lekythoi for the dead.

Γρ. οὗτος δ’ ἔστι τίς;
Νεανίας. ὃς τοῖς νεκροῖσι ζωγραφεῖ τὰς ληκύθους.

Plutarch, Life of Numa, 17.

So, distinguishing the whole people by the several arts and trades, he formed the companies of musicians, goldsmiths, carpenters, dyers, shoemakers, skinners, braziers, and potters (A. H. Clough).

Ἦν δὲ ἡ διανομὴ κατὰ τὰς τέχνας, αὐλητῶν, χρυσοχόων, τεκτόνων, βαφέων, σκυτοτόμων, σκυτοδέψων, χαλκέων, κεραμέων.

Plato, Euthydemos, 301, c, d.

What, said he, is the business of a good workman? Tell me, in the first place, whose business is hammering?

The smith's.

And whose the making of pots?

The potter's.

And who has to kill and skin and mince and boil and roast?

The cook, I said.

And if a man does his business, he does rightly?

Certainly.

And the business of the cook is to cut up and skin; you have admitted that?

Yes, I have, but you must not be too hard upon me.

Then if some one were to kill, mince, boil, roast the cook, he would do his business, and if he were to hammer the smith, and make a pot of the potter, he would do their business (Jowett).

Οἶσθα οὖν, ἔφη, ὅτι προσήκει ἑκάστοις τῶν δημιουργῶν; πρῶτον τίνα χαλκεύειν προσήκει, οἶσθα;—Ἔγωγε· ὅτι χαλκέα.—τί δέ, κεραμεύειν; κεραμέα.—τί δέ, σφάττειν τε καὶ ἐκδέρειν καὶ τὰ μικρὰ κρέα κατακόψαντα ἕψειν καὶ ὀπτᾶν;—Μάγειρον, ἦν δ' ἐγώ.—Οὐκοῦν ἐάν τις, ἔφη, τὰ προσήκοντα πράττῃ, ὀρθῶς πράξει; Μάλιστα.—Προσήκει δέ γε, ὡς φῄς, τὸν μάγειρον κατακόπτειν καὶ ἐκδέρειν; ὡμολόγησας ταῦτα ἢ οὔ; Ὡμολόγησα, ἔφην, ἀλλὰ συγγνώμην μοι ἔχε —Δῆλον τοίνυν, ἦ δ' ὅς, ὅτι ἄν τις σφάξας τὸν μάγειρον καὶ κατακόψας ἐψήσῃ καὶ ὀπτήσῃ, τὰ προσήκοντα ποιήσει. καὶ ἐὰν τὸν χαλκέα τις αὐτὸν χαλκεύῃ καὶ τὸν κεραμέα κεραμεύῃ, καὶ οὗτος τὰ προσήκοντα πράξει.

Justinus, Historiae Philippicae, XXII, 1, 1 and 2.

Agathocles, the tyrant of Sicily, who succeeded to the great power of the elder Dionysius, came into the splendor of a kingdom from a humble and base family. And too, being born in Sicily of a potter, he had a boyhood not more honorable than his origin.

Agathocles, Siciliae tyrannus, qui magnitudini prioris Dionysii successit, ad regni maiestatem ex humili et sordido genere pervenit. Quippe in Sicilia patre figulo natus non honestiorem pueritiam quam principia originis habuit.

Much has been written about the lowly status of Greek potters,[1] and the above references bear out this general idea. The craft of pottery was evidently placed on a par with other trades, and all such manual work was not considered a worthy occupation of free-born citizens, and left mostly to the metics, or non-citizens. We know this not only from texts and inscriptions on stone, but also from the non-Attic forms of the names of the potters, as well as the inscriptions on the vases which frequently show non-Attic spellings. It would be absurd, however, to infer that all pottery was as contemptuously regarded as the rough little tomb lekythoi[2] and the pinakes referred to by Aristophanes and Isokrates. And this is borne out by the following references.

Plato, Hippias Maior, p. 288 d.

If a skilful potter had made the vessel smooth and rounded and well baked, like some of the fine two-handled jars which hold six choai—if he should ask us about such a vessel as this, we should be obliged to agree that it was beautiful.

Εἴπερ ἡ χύτρα κεκραμευμένη εἴη ὑπὸ ἀγαθοῦ κεραμέως λεία καὶ στρογγύλη καὶ καλῶς ὠπτημένη, οἷαι τῶν καλῶν χυτρῶν εἰσί τινες δίωτοι, τῶν ἓξ χοᾶς χωρουσῶν, πάγκαλαι, εἰ τοιαύτην ἐρωτῴη χύτραν, καλὴν ὁμολογητέον εἶναι.

Pliny, Natural History, xxxv, 161.

At Erythrae in the temple there are shown today two amphorai consecrated on account of their thinness, a pupil and a teacher having contested as to which of them could draw the clay thinner.

Erythris in templo hodieque ostenduntur amphorae duae propter tenuitatem consecratae discipuli magistrique certamine, uter tenuiorem humum duceret.

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[1] See especially Pottier, Catalogue des Vases au Musée du Louvre, III, pp. 690 ff.

[2] There is no reason to assume, as has been done by Walters, History of Ancient Pottery, I, pp. 132 and others, that these lekythoi are the beautiful white lekythoi in our collections; it is more likely that they are the very roughly painted little jugs found in large quantities in tombs, but rarely placed with selected museum examples.

Amphis, AmpeloURgos, I.

Meincke, Fragmenta Comicorum Graecorum, III, p. 302.

There is no sweeter solace in life for human ills than craftsmanship; for the mind, absorbed in its study, sails past all troubles and forgets them.

Οὐκ ἔστιν οὐδὲν ἀτυχίας ἀνθρωπίνης
παραμύθιον γλυκύτερον ἐν βίῳ τέχνης·
ἐπὶ τοῦ μαθήματος γὰρ ἑστηκὼς ὁ νοῦς
αὑτοῦ λέληθε παραπλέων τὰς συμφοράς.

Pindar, Nemean Odes, x, 35, 36.

And in earthenware baked in the fire, within the closure of figured urns, there came among the goodly folk of Hera the prize of the olive-fruit (Myers).

γαίᾳ δὲ καυθείσᾳ πυρὶ καρπὸς ἐλαίας
ἔμολεν Ἥρας τὸν εὐάνορα λαὸν
ἐν ἀγγέων ἕρκεσιν παμποικίλοις

Simonides, Fragments, 155 (213) (Bergk).

And he won five garlands in succession at the Panathenaic games, amphorai full of oil.

Καὶ Παναθηναίοις στεφάνους λάβε πέντ᾽ ἐπ᾽ ἀέθλοις
ἑξῆς ἀμφιφορεῖς ἐλαίου.

That finely executed pottery was held in high esteem is evident from the remarks of Plato, Pliny, and Pindar; and there certainly could be no more enthusiastic eulogy of craftsmanship than Amphis' beautiful lines. Moreover, the fact that clay vases were used as prizes at the most important games at Athens certainly points to considerable and wide-spread appreciation of them.

Ktesias ap. Athenaeus, p. 464 a.

And Ktesias says, "Among the Persians he whom the king wishes to insult uses pottery vessels."

Καὶ γὰρ Κτησίας "παρὰ Πέρσαις" φησίν, "ὃν ἂν βασιλεὺς ἀτιμάσῃ, κεραμέοις χρῆται".

Plutarch, Life of Galba, 12.

When he was dining with Claudius Caesar he stole a silver cup, and Caesar, finding it out, invited him to dinner again on the next day, but ordered his servants to bring out and put before the guest nothing silver, but everything of pottery.

Δειπνῶν δὲ παρὰ Κλαυδίῳ Καίσαρι ποτήριον ἀργυροῦν ὑφείλετο. πυθόμενος δὲ ὁ Καῖσαρ τῇ ὑστεραίᾳ πάλιν αὐτὸν ἐπὶ δεῖπνον ἐκάλεσεν, ἐλθόντι δὲ ἐκέλευσεν ἐκείνῳ μηδὲν ἀργυροῦν, ἀλλὰ κεράμεα πάντα προσφέρειν καὶ παρατιθέναι τοὺς ὑπηρέτας.

Tibullus, Elegies, I, 1, 37 f.

Come, ye gods, nor scorn the gifts from a poor man's table, from clean pottery vessels.

Adsitis, divi, neu vos e paupere mensa
dona nec e puris spernite fictilibus.

Juvenal, Satires, III, 168.

[Even a poor man] is ashamed to dine off pottery dishes.

fictilibus cenare pudet—

Martial, Epigrams, XIV, 98.

We advise you not overmuch to despise Arretian vases: Tuscan earthenware was luxury to Porsena (W. E. Ker).

Arretina nimis ne spernas vasa monemus.
lautus erat Tuscis Porsena fictilibus.

Lucian, Prometheus, 1.

Then you say I am Prometheus? If, Sir, it is because I too work in clay, I recognize the similarity and acknowledge that I am like him, nor do I refuse to be called a potter.

Οὐκ οὖν Προμηθέα με εἶναι φῄς; εἰ μὲν κατὰ τοῦτο, ὦ ἄριστε, ὡς πηλίνων κἀμοὶ τῶν ἔργων ὄντων, γνωρίζω τὴν εἰκόνα καί φημι ὅμοιος εἶναι αὐτῷ, οὐδ' ἀναίνομαι πηλοπλάθος ἀκούειν.

Athenaeus, XI, p. 482 b.

(*Repeated by Macrobius, Satires,* v, 21, 10.)

They placed a krater for the gods, not of silver nor set with stones, but of clay from Kolias.

Κρατῆρα γὰρ ἵστασαν τοῖς θεοῖς, οὐκ ἀργυροῦν οὐδὲ λιθοκόλλητον, ἀλλὰ γῆς Κωλιάδος.

Though the Persians and the Romans set great store by metal vases and regarded clay vases as fit only for a poor man's table, the Greeks had no such feelings, as we learn from Athenaeus and from innumerable vase paintings of banquets.

Inscriptiones Graccae, I, *Suppl.*, 362, p. 79.

Euphronios the potter offered .... in supplication to (Athena) Hygieia.	(Ε)ὐφρόνιος (ἀνέθηκεν ὁ) κεραμεύς (.........ἱκεσί)αν Ὑγιεία(ι).

Inscriptiones Graecae, I, *Suppl.* 373^{215}, p. 101.

Mnesiades the potter and Andokides dedicated me.	(Μν)ησιάδης κεραμεύς με καὶ Ἀνδοκίδης ἀνέθηκεν.

Corpus Inscriptionum Graecarum, 3485.

The lord of the land and sea, Imperator Caesar M. Aurelius Severus Antoninus, Pius, Augustus, the potters have erected from their own property.	Τὸν γῆς καὶ θαλάσσης δεσπότην Αὐτοκράτορα Καίσαρα Μ. Αὐρ(ήλιον) Σευῆρον Ἀντωνῖνον, Εὐσεβῆ, Σεβαστόν, (ἐκ τῶν) ἰδίων ἵδ(ρυσαν) οἱ κεραμεῖς.

Corpus Inscriptionum Graecarum, 9188.

Sarcophagus of Theophilos and his son Tyrannos, a potter by trade.	Σωματοτήκη Θεοφίλου (καὶ τοῦ) (α)ὐ(τ)οῦ (ὑ)οῦ Τυράννου τὴν τέχνην κερα(μέως).

Corpus Inscriptionum Graecarum, addenda 4212.

I, Sesames the potter, have bought through the board of magistrates this burial vault for myself and my wife Elpis and my mother-in-law Euphrosyne and for Ianoarios and our children, and for Soterichos my father-in-law. No one else shall be buried here, since (the violator) shall pay to the sacred treasurer 1500 denarii.	Σ)ησάμας κεραμεὺς ὠνησάμην διὰ τῶν ἀρχείων τὸν πυργίσκον ἑαυτῷ καὶ γυναικί μου Ἐλπίδι καὶ τ(ῇ) πενθερ(ίδι μου) Εὐφροσύνῃ κ(αὶ) Ἰανοαρίῳ καὶ τ(έ)κνοις ἡ(μῶν) καὶ Σωτηρίχῳ τῷ πενθε(ρῷ). ἑτέρῳ δὲ οὐδενὶ ἐξέσται (τεθ)ῆναι. ἐπεὶ ἀ(πο)(τ)είσει τῷ (ἱερωτάτῳ ταμε(ί)ῳ δηναρία αφ.

These inscriptions of dedications show that potters sometimes became people of means and influence.

Plato, Republic, p. 467 a.

Did you never observe in the arts how the potters' boys look on and help, long before they touch the wheel? (Jowett).	Ἦ οὐχ ᾔσθησαι τὰ περὶ τὰς τέχνας, οἷον τοὺς τῶν κεραμέων παῖδας, ὡς πολὺν χρόνον διακονοῦντες θεωροῦσι πρὶν ἅπτεσθαι τοῦ κεραμεύειν;

Quintilian, Institutio Oratoria, II, 17, 3.

..For what man is there so bereft, I will not say of learning, but of sense, that he thinks that there is an art of constructing and of weaving, and of making vases from clay, but that rhetoric, that greatest and noblest work, as I said above, has risen to such sublime heights without art?

..nam quis est adeo non ab eruditione modo, sed a sensu remotus hominis, ut fabricandi quidem et texendi et e luto vasa ducendi artem putet, rhetoricen autem, maximum ac pulcherrimum, ut supra diximus, opus, in tam sublime fastigium existimet sine arte venisse?

Suidas, Lexicon, s. v. Κεραμεύειν.

To make pottery: commonly said instead of "to work hard."

Κεραμεύειν. κοινῶς ἀντὶ τοῦ κατεργάζεσθαι.

Hesiod, Works and Days, 25 f.

Potter bears a grudge against potter, and carpenter against carpenter, and beggar envies beggar, and minstrel is jealous of minstrel.

Καὶ κεραμεὺς κεραμεῖ κοτέει καὶ τέκτονι τέκτων
καὶ πτωχὸς πτωχῷ φθονέει καὶ ἀοιδὸς ἀοιδῷ.

Aristotle, Rhetoric, 2, 4, 21, 22.

[We are friendly towards] our equals, and towards those who have the same interests, if they do not clash with us, and if their livelihood does not come from the same source, for thus arises the proverb "Potter hates potter."

Καὶ τοὺς ὁμοίους καὶ ταὐτὰ ἐπιτηδεύοντας, ἐὰν μὴ παρενοχλῶσι μὴ δ' ἀπὸ ταὐτοῦ ὁ βίος. γίγνεται γὰρ οὕτω τὸ κεραμεὺς κεραμεῖ.

Aristotle, Nicomachaean Ethics, 8, 1, 6.

For some define [friendship] as a kind of resemblance, and claim that those who resemble each other are friends, whence is the saying "Like to like," and "Jackdaw to Jackdaw," and so on. Others, on the contrary, say that all such people are like potters to each other.

Οἱ μὲν γὰρ ὁμοιότητα τινὰ τιθέασιν αὐτὴν καὶ τοὺς ὁμοίους φίλους, ὅθεν τὸν ὅμοιόν φασιν ὡς τὸν ὅμοιον, καὶ κολοιὸν ποτὶ κολοιόν, καὶ τὰ τοιαῦτα. οἱ δ' ἐξ ἐναντίας κεραμεῖς πάντας τοὺς τοιούτους ἀλλήλοις φασὶν εἶναι.

Evidently it was fully recognized that pottery was a craft which needed a long apprenticeship, and in such a highly specialized art we are not surprised to read of the keen rivalry existing among potters. The inscription by Euthymides on one of his vases, "Never has Euphronios painted the like of this" (cf. Hoppin, Handbook of Attic Red-Figured Vases, p. 432), is evidence of the same spirit.

Judging from the evidence collected above it is fair to assume that though the estimate of potters and pottery varied at different times, in the period of Athenian vase painting it was distinctly high. Potters had, it is true, no social status; but they were respected members of the community, and the keen appreciation of their work had as its natural result eager rivalry among the potters and the setting of high standards. That their craft was regarded as a "trade" is of course nothing new. Artists as a class have only lately been promoted to the higher social ranks. We need only recall Albrecht Dürer's description of the great Procession from the Church of Our Lady at Antwerp, in which he lists the painters and sculptors and goldsmiths with "the masons, the joiners, the carpenters, the sailors, the fishermen, the butchers, the leatherers, the clothmakers, the bakers, the tailors, the cordwainers," and refers to the group as "workmen of all kinds and many craftsmen and dealers who work for their livelihood." This is not so much an indignity to art as a wholesome appreciation of all manual labor.

CONCLUSION

THE following is a summary of the technical processes of the black-figured and red-figured Athenian vases in the order which our study of the subject has suggested.

I. THE PREPARATION OF THE CLAY

(1) Mixing the requisite ingredients (unless the natural clay was satisfactory).
(2) Washing.
(3) Wedging or kneading.

II. THE FASHIONING OF THE VASE

(1) Throwing.
(2) Turning.
(3) Polishing.
(4) Attaching handles.

III. THE DECORATION OF THE VASE

a. Black-figured Technique.

(1) Application of red ochre over the whole surface.

Traces of the red ochre solution on black-figured vases are not common; so that it is possible that its application was not a regular proceeding.

(2) Preliminary sketch for design.

As this was completely covered by the black glaze afterwards and there are therefore only occasional traces of it now (cf. e.g. Furtwängler u. Reichhold, Griechische Vasenmalerei, I, pl. 4), it is uncertain, though inherently probable, that such a sketch was generally made.

(3) Painting of the design, including figures, decorative motives, and backgrounds, in black glaze.
(4) Incision of details.
(5) Addition of purple and white accessory colors.

b. Red-figured Technique.

(1) Application of red ochre over the whole surface.
(2) Preliminary sketch for design with a blunt instrument.
(3) Painting of the design, the decorative motives, and the solid black surfaces.
The process of the figure painting was as follows: the outlines of the figures were indicated outside the spaces intended for them, first with a narrow line, then with a broader contour stripe; then the details within the red silhouette, and sometimes the outlines, were painted in black glaze lines; finally the background was filled in with the black glaze.
(4) Addition of accessory colors if needed.

IV. THE FIRING OF THE VASE

The most important revisions of current theories on the technique of Athenian vases which our treatment of the subject has suggested are:

(1) The use of turning as a regular process applied to the vases after they were thrown. To this operation they owe much of their finish and refinement.

(2) The application of a red ochre pigment on the surface of the vases in their raw state, before they were decorated or fired. It is to this red ochre application that the present orangey color of the Athenian vases is due, as against the pinkish hue shown in the fractures of the clay. Originally, however, this color was even deeper, approaching that of bright red copper.

(3) Both the glaze and the accessory colors were applied when the vases were in leather-hard condition, before any firing. Instead of the two, three, or four firings often assumed by archaeologists, the evidence points to only one fire, after total completion of the vase.

(4) The great majority of Athenian vases were made for actual use, not for votive, decorative, or funeral purposes, as is still often assumed.

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